

EXHIBIT B

Feb. 9 Howell Rebuttal

**IN THE UNITED STATES BANKRUPTCY COURT
FOR THE DISTRICT OF DELAWARE**

In re:

FTX TRADING LTD., *et al.*,¹

Debtors.

Chapter 11

Case No. 22-11068 (JTD)

(Jointly Administered)

REBUTTAL EXPERT REPORT OF SABRINA T. HOWELL

FEBRUARY 9, 2024

¹ The last four digits of FTX Trading Ltd.'s and Alameda Research LLC's tax identification number are 3288 and 4063 respectively. Due to the large number of debtor entities in these Chapter 11 Cases, a complete list of the Debtors and the last four digits of their federal tax identification numbers is not provided herein. A complete list of such information may be obtained on the website of the Debtors' claims and noticing agent at <https://cases.ra.kroll.com/FTX>. The principal place of business of Debtor Emergent Fidelity Technologies Ltd is Unit 3B, Bryson's Commercial Complex, Friars Hill Road, St. John's, Antigua and Barbuda.

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I. INTRODUCTION

A. Background and Assignment

1. On December 27, 2023, I filed an expert report (the “Howell Report”) in which I estimated asset liquidation discounts (“ALDs”) and discounts for lack of marketability (“DLOMs”) for a wide range of digital assets on which customer claims are based in these Chapter 11 Cases.² The Howell Report includes my opinions with respect to MAPS, OXY, and SRM.

2. In the Howell Report, I estimated that in an orderly liquidation commencing on the Petition Date, the Debtors’ holdings of MAPS and OXY tokens would be subject to a 100 percent ALD due to the overwhelmingly large amount of these tokens held by the Debtors relative to the size of the market for these assets. I similarly estimated a 58 percent ALD for SRM.³ Moreover, I understand that as of the Petition Date, certain customer claims based on MAPS, OXY, and SRM were non-marketable. For these claims, I estimated DLOMs ranging from 21 percent to 43 percent.⁴

3. On January 26, 2024, I received a report authored by Fotios Konstantinidis on behalf of FTX customers Maps Vault Ltd. and Oxygen Vault Ltd. (“Konstantinidis Report”),⁵ as well as a supplemental report by Mr. Konstantinidis on behalf of FTX customers Fondation Serendipity, Fondation Elements, Serendipity Network Ltd and Liquidity Network Ltd.

² Expert Report of Sabrina T. Howell, December 27, 2023 (“Howell Report”). I also filed a Supplemental Declaration on January 28, 2024 (“Howell Supplemental Declaration”). Any abbreviations or capitalized terms not otherwise defined herein are as defined in the Howell Report.

³ Howell Report, Exhibit 3.

⁴ Howell Report, Exhibit 4.

⁵ Expert Report of Fotios Konstantinidis on behalf of Maps Vault Ltd. and Oxygen Vault Ltd., January 26, 2024 (“Konstantinidis Report”).

(“Konstantinidis Supplemental Report”).⁶ In his reports, Mr. Konstantinidis proposed an alternative set of discounts to the Petition Time prices of MAPS, OXY, and SRM (the “at-issue tokens”), ranging from 36 percent to 46 percent.⁷ Mr. Konstantinidis also raised certain critiques of the methodologies used in the Howell Report.

4. I was asked by Sullivan & Cromwell LLP (“Counsel”), on behalf of the Debtors, to evaluate Mr. Konstantinidis’ methodologies and respond to the critiques of the methodologies used in the Howell Report offered by Mr. Konstantinidis.

B. Qualifications

5. Section I.B of the Howell Report summarizes my qualifications. *See* Appendix A of the Howell Report for my most recent curriculum vitae.

C. Compensation

6. I am being compensated for my time spent working on this matter, including any testimony, at my standard billing rate of \$950 per hour. Some of the research and analysis for this report was performed by Analysis Group personnel under my direction and guidance, and I receive additional compensation based on their fees. Neither my compensation nor that of Analysis Group is contingent upon my findings, the testimony I may give, or the outcome of this matter.

⁶ Expert Report of Fotios Konstantinidis on behalf of Fondation Elements, Liquidity Network Ltd, Fondation Serendipity and Serendipity Network Ltd., January 26, 2024 (“Konstantinidis Supplemental Report”).

⁷ Konstantinidis Report, ¶ 49; Konstantinidis Supplemental Report, ¶ 24.

D. Materials Considered

7. In preparing this report, I, along with Analysis Group staff working under my direction, reviewed various documents and data sources. Appendix A to this report lists documents and data sources that I considered in preparing this report that are additional to the materials I considered in preparing the Howell Report. My work in this matter is ongoing, and I may supplement this report if information that alters any of my opinions comes to my attention after this report is submitted, including at a future hearing before the Bankruptcy Court.

II. SUMMARY OF CONCLUSIONS

8. The conclusions I drew in the Howell Report remain unchanged after having reviewed the Konstantinidis Report and associated backup materials. In addition, based on my review of the Konstantinidis Report and its backup materials, as well as the materials listed in Appendix A, I have reached the following conclusions.

- Mr. Konstantinidis' critiques of my ALD calculations are unfounded. It is well established in the literature that selling large quantities of an asset relative to daily trading volumes negatively impacts the price. In the case of the at-issue tokens—where liquidating the holdings would require many years of trading—there can be little doubt that an ALD is warranted. The model that I used to calculate the ALDs in the Howell Report is drawn from peer-reviewed literature and it provides a reasonable, if not conservative, basis for calculating these discounts. As I described in my Supplemental Declaration in this matter, it is appropriate to calculate the ALD based on the Debtors' holdings of the tokens to be liquidated. The close ties between the at-issue tokens and FTX, Alameda Research ("Alameda"), and Sam Bankman-Fried make doing so even more appropriate.

- Mr. Konstantinidis' critiques of my DLOM methodology are similarly unfounded. My approach is grounded in established finance theory and is based on a model from peer-reviewed literature. Furthermore, for the time horizons relevant for the Howell Report, the results from the model that I use fall between the results from the two models that Mr. Konstantinidis uses—models that he acknowledges in his source materials can understate the DLOM.
- Mr. Konstantinidis appears to misunderstand how the ALD and the DLOM work and why both are applicable to non-marketable illiquid tokens. The creditors on whose behalf Mr. Konstantinidis submitted his reports had customer balances that included both locked and unlocked tokens. As a general matter, assets with marketability restrictions are worth less than their marketable counterparts. By extension, locked tokens are worth less than unlocked tokens, a fact that Mr. Konstantinidis readily concedes. As noted above, the estate is liquidating all its holdings, necessitating an ALD. Therefore, one can think of the customer claims that include locked tokens as going through a two-step process. First, all the tokens need to be "unlocked" in order to be liquidated, which is implemented by applying the DLOM to the Petition Time price of the tokens. This adjustment to the value of claims based on digital assets reflects the pre-bankruptcy reality that locked tokens were worth less than their unlocked counterparts. Second, the ALD is applied to the Petition Time price for unlocked tokens and to the DLOM-adjusted Petition Time price for non-marketable tokens.
- Mr. Konstantinidis' critiques of the inputs that I use in my ALD model are unfounded and again point to a fundamental misunderstanding of how the model works. Indeed, if one takes Mr. Konstantinidis' proposed alternative time periods for estimating price volatility

and trading volume, my estimated discounts for MAPS and OXY stay at 100 percent and for SRM, the discounts increase to over 60 percent. Even if one accepts Mr. Konstantinidis' assertion that there is additional trading volume that should be included in my calculations or different data sources used for trading volume, my estimated ALDs for MAPS and OXY remain at 100 percent and for SRM they range from 42 to 64 percent, bracketing my estimate of 58 percent.

- Mr. Konstantinidis' proposed methodology for calculating discounts for the at-issue tokens is built on unsupported assumptions and underestimates the appropriate level of discount applicable to the at-issue tokens. He assumes that the trading volume for all the at-issue tokens would increase dramatically after FTX filed for bankruptcy, in spite of the fact that these tokens were closely tied to Sam Bankman-Fried and relied on substantial institutional support from FTX. They were colloquially referred to as "Sam Coins." Using more reasonable assumptions about the likely future trading volume for the at-issue tokens in Mr. Konstantinidis' methodology results in discounts that are close to those that I calculate in the Howell Report, including 100 percent discounts for MAPS and OXY.

III. BACKGROUND ON AT-ISSUE TOKENS

9. The at-issue tokens all had close ties to FTX, Alameda, and Sam Bankman-Fried, and are referred to as "Sam Coins" in popular media.⁸ Alameda was an investor,⁹ and Mr.

⁸ Kuhn, Daniel, "Sam Bankman-Fried's Wildest, Craziest, Dumbest Trades," *CoinDesk*, November 07, 2023, available at <https://www.coindesk.com/consensus-magazine/2023/11/07/sam-bankman-frieds-wildest-craziest-dumbest-trades/>.

⁹ Luo, Xinyi, "Tokens of Alameda-Backed DeFi Projects Maps.me and Oxygen Locked Up at FTX," *CoinDesk*, November 15, 2022, available at <https://www.coindesk.com/business/2022/11/15/tokens-of-alameda-backed-defi-projects-mapsme-and-oxygen-locked-up-at-ftx/>.

Bankman-Fried an advisor,¹⁰ to the projects underlying MAPS and OXY, while FTX and Alameda created SRM.¹¹ Over 95 percent of the maximum supply of each of the at-issue tokens were in the possession of FTX and Alameda.¹² Thus, from the outset, the performance of investments in the at-issue tokens was closely tied to the fortunes of FTX and Sam Bankman-Fried. As I showed in the Howell Report, liquidating the Debtors' holdings of the at-issue tokens would have quickly saturated the market for these tokens, and resulted in ALDs of 100 percent for MAPS and OXY, and 58 percent for SRM.¹³

10. The at-issue tokens collectively comprised 53 percent of the face value of the Debtors' holdings and were therefore significant to the balance sheets of FTX and Alameda.¹⁴ However, these face values are misleading representations of the true market value of the Debtors' holdings of the at-issue tokens. For each of the at-issue tokens, observed market prices are derived from a free float (the amount of tokens actually available for trading in the marketplace) of *less than three percent* of the tokens' maximum supply.¹⁵ Observers have argued that restricting the

¹⁰ "Maps: Whitepaper," *Maps.me*, January 2021, available at <https://maps.me/token/MAPS.pdf> ("Maps White Paper"), p. 9; "Oxygen: The Prime Brokerage Protocol," *Oxygen*, December 2020, available at <https://www.oxygen.org/Oxygen.pdf> ("Oxygen White Paper"), p. 10.

¹¹ Solana Foundation, "FTX Chooses Solana for Serum: A High-Speed, Non-Custodial Decentralized Derivatives Exchange," *Solana*, July 26, 2020, available at <https://solana.com/news/ftx-chooses-solana-for-serum--a-high-speed--non-custodial-decentralized-derivatives-exchange>; "Overview," *Project Serum*, available at <https://docs.projectserum.com/introduction/overview>.

¹² Maximum supply is "the best approximation of the maximum amount of coins that will ever exist in the lifetime of the cryptocurrency." "FAQ," *CoinMarketCap*, available at <https://coinmarketcap.com/faq/>.

¹³ Howell Report, Exhibit 3.

¹⁴ Numerator includes all Debtors' Holdings associated with the at-issue tokens except spot+ derivatives and futures. Denominator includes Debtors' Holdings for all digital assets except spot+ derivatives, futures, leveraged tokens, and tokenized stocks.

¹⁵ See, e.g., "Introducing Free Float Supply," *Coin Metrics*, available at <https://coinmetrics.io/introducing-free-float-supply/>. For digital assets, free float is also referred to as "circulating supply." "FAQ," *CoinMarketCap*, available at <https://coinmarketcap.com/faq/> ("*Circulating Supply* is the best approximation of the number of coins that are circulating in the market and in the general public's hands. ... We've found that *Circulating Supply* is a much better metric for determining the market capitalization. Coins that are locked, reserved, or not able to be sold on the public market are coins that can't affect the price and thus should not be allowed to affect the market

free float for the at-issue tokens was a deliberate strategy for FTX and Alameda to inflate the market prices of the at-issue tokens, and in turn inflate the value of FTX's and Alameda's balance sheets.¹⁶ Mr. Bankman-Fried had also commented that a strategy of allowing only a very small free float relative to the maximum supply of a token would enable the creator of the token to artificially inflate the trading price of the token and thus create collateralizable "value" for holders of the uncirculated tokens, even if the true value of the token were zero.¹⁷ The at-issue tokens appear to be consistent with this strategy, which undermines the idea that the broader holdings of the at-issue tokens could be valued at the observed prices of a small number of tradeable tokens.

capitalization as well. The method of using the *Circulating Supply* is analogous to the method of using public float for determining the market capitalization of companies in traditional investing." (Emphasis in the original.)).

¹⁶ Kuhn, Daniel, "Sam Bankman-Fried's Wildest, Craziest, Dumbest Trades," *CoinDesk*, November 07, 2023, available at <https://www.coindesk.com/consensus-magazine/2023/11/07/sam-bankman-frieds-wildest-craziest-dumbest-trades/> ("SBF [Sam Bankman Fried] used his trading firm to be a net buyer of his own sh*tcoins. He then used those holdings to leverage up, and take out cash loans. This was a repeat strategy for SBF, which he seemingly did multiple times with tokens like Serum (SRM), Maps (MAPS), Oxy (OXY) and FTT — tokens now known as 'Sam Coins' because of his sizable ownership and direct control over the supply."). Flitter, Emily and David Yaffe-Bellany, "FTX Founder Gamed Markets, Crypto Rivals Say," *New York Times*, January 18, 2023, available at <https://www.nytimes.com/2023/01/18/business/ftx-sbf-crypto-markets.html> ("Then his [Sam Bankman Fried's] hedge fund, Alameda Research, would buy some of these newly listed Samcoins to prop up their value").

¹⁷ Alloway, Tracy and Joe Weisenthal, "Transcript: Sam Bankman-Fried and Matt Levine on How to Make Money in Crypto," *Bloomberg*, April 25, 2022, available at <https://www.bloomberg.com/news/articles/2022-04-25/odd-lots-full-transcript-sam-bankman-fried-and-matt-levine-on-crypto?embedded-checkout=true> ("[I]n like five minutes with an internet connection, you could create such a box and such a token, and that it should reflect like, you know, it should be worth like \$180 or something market cap for like that, you know, that effort that you put into it. In the world that we're in, if you do this, everyone's gonna be like, 'Ooh, box token. Maybe it's cool. If you buy in box token,' you know, that's gonna appear on Twitter and it'll have a \$20 million market cap. And of course, one thing that you could do is you could like make the float very low and whatever, you know, maybe there haven't been \$20 million dollars that have flowed into it yet. Maybe that's sort of like, is it, you know, mark to market fully diluted valuation or something, but I acknowledge that it's not totally clear that this thing should have market cap, but empirically I claim it would have market cap. ... This box is worth zero obviously. And like that, you know, you can't like keep this smart cap or something. But on the other hand, if everyone kind of now thinks that this box token is worth about a billion dollar market cap, that's what people are pricing it at and sort of has that market cap. Everyone's gonna mark to market. In fact, you can even finance this, right? You put X token in a borrow lending protocol and borrow dollars with it. If you think it's worth like less than two thirds of that, you could even just like put some in there, take the dollars out. Never, you know, give the dollars back. You just get liquidated eventually. And it is sort of like real monetizable stuff in some senses. And you know, at some point if the world never decides that we are wrong about this in like a coordinated way, right? Like you're kind of the guy calling and saying, no, this thing's actually worthless, but in what sense are you right?").

A. MAPS

11. MAPS is the utility and governance token for the Maps.me application.¹⁸ Maps.me was initially launched as an offline map application.¹⁹ Maps.me 2.0 was launched in December 2020 with a new, embedded digital wallet which could work with different fiat currencies and had various payment features.²⁰ In January 2021, the MAPS token was launched.²¹ MAPS aimed to provide value to holders of the token in three main ways: (i) benefits from Maps.me revenues; (ii) personalized rewards and services; and (iii) governance of Maps.me.²²

12. FTX and Mr. Bankman-Fried were closely involved in MAPS, with Mr. Bankman-Fried and Ramnik Arora (FTX's Head of Product) listed as "advisors" to the project.²³ Mr. Bankman-Fried promoted MAPS publicly²⁴ and FTX hosted MAPS's Initial Exchange Offering

¹⁸ See Maps White Paper, pp. 7-8.

¹⁹ Photo, Dmitry O., "MAPS.ME launches its own rating platform with reviews," *Medium*, November 15, 2017, accessible at <https://medium.com/@Dimitryophoto/maps-me-launches-its-own-rating-platform-with-reviews-4eae749afc40>.

²⁰ Maps Token, "MAPS and Maps.me — FAQ," *Medium*, February 02, 2021, available at <https://mapstoken.medium.com/maps-and-maps-me-faq-a204bfd976aa>. See also Oxygen, "Partnerships: Maps.me," *Medium*, March 22, 2021, available at <https://oxygenprotocol.medium.com/partnerships-maps-me-4462628add85>.

²¹ Ezquer, Evan, "Maps.me Raises \$50M as MAPS Token Gets Listed in BitMax Amid Upcoming IEO," *Asia Crypto Today*, January 18, 2021, available at <https://www.asiacryptotoday.com/maps-me-raises-50m-as-maps-token-gets-listed-in-bitmax-amid-upcoming-ieo/>.

²² Maps White Paper, pp. 7-8. See also "Token," *Maps.me*, available at <https://maps.me/token/>.

²³ Maps White Paper, p. 9.

²⁴ See, e.g., Haig, Samuel, "SBF leads \$50M funding round to bring DeFi to Maps.me's 140M users," *Cointelegraph*, January 18, 2021, available at <https://cointelegraph.com/news/sbf-leads-50m-funding-round-to-bring-defi-to-maps-me-s-140m-users>. See also Flitter, Emily and David Yaffe-Bellany, "FTX Founder Gamed Markets, Crypto Rivals Say," *New York Times*, January 18, 2023, available at <https://www.nytimes.com/2023/01/18/business/ftx-sbf-crypto-markets.html>.

in January 2021.²⁵ In January 2021, Alameda led a \$50 million investment round in Maps.me.²⁶ Consistent with the close involvement of FTX and Alameda with MAPS, data available to me indicate that as of the Petition Date, FTX and Alameda held over 99 percent of the maximum supply of MAPS.²⁷ As of the Petition Date, less than one percent of the maximum supply of MAPS was freely tradeable.²⁸

13. In the Howell Report, I estimated that the Debtors' holdings were equivalent to 19,750x the daily average trading volume of MAPS. This means that even if one could have sold amounts equal to the average trading volume every single day, it would still take 54 years to sell off the Debtors' total holdings.²⁹ But liquidating even a small fraction of the Debtors' holdings would have quickly overwhelmed the available liquidity in the market for MAPS. Using a formula from peer-reviewed literature on liquidation discounts, I estimated that MAPS would have been subject to a 100 percent ALD.

²⁵ Ezquer, Evan, "Maps.me Raises \$50M as MAPS Token Gets Listed in BitMax Amid Upcoming IEO," *Asia Crypto Today*, January 18, 2021, available at <https://www.asiacryptotoday.com/maps-me-raises-50m-as-maps-token-gets-listed-in-bitmax-amid-upcoming-ieo/>. The difference between Initial Exchange Offering (IEOs) and Initial Coin Offerings (ICOs) is: "ICOs are organized through a holding company's own platform, while IEOs are done by cryptocurrency exchanges on behalf of a company that is raising funds via token sales." "IEO 101: A beginner's guide to an exchange administered fundraising event," *Cointelegraph*, available at <https://cointelegraph.com/learn/ieo-101-a-beginners-guide-to-an-exchange-administered-fundraising-event>.

²⁶ Luo, Xinyi, "Tokens of Alameda-Backed DeFi Projects Maps.me and Oxygen Locked Up at FTX," *CoinDesk*, November 15, 2022, available at <https://www.coindesk.com/business/2022/11/15/tokens-of-alameda-backed-defi-projects-mapsme-and-oxygen-locked-up-at-ftx/>.

²⁷ See Workpaper 1. I understand that Debtors held both the native Solana chain MAPS tokens and the ERC20 MAPS tokens pertaining to 0x2b915b505c017abb1547aa5ab355fbc69865cc6d token contract address. Therefore, I calculate the maximum supply as the sum of maximum supplies of the two versions of the token.

²⁸ See Workpaper 1.

²⁹ Howell Report, ¶ 66.

B. OXY

14. OXY is the utility and governance token of the Oxygen Protocol.³⁰ The Oxygen Protocol aims to provide financial infrastructure in which participants can lend or borrow funds and trade assets.³¹ The Oxygen Protocol appears to have been substantively defunct since the collapse of FTX.³² OXY aimed to provide value to holders of the token in three ways: (i) benefits from Oxygen Protocol revenues; (ii) reduced protocol usage fees; and (iii) governance of the Oxygen Protocol.³³ The purported benefits provided by OXY were therefore similar to the benefits provided by FTX's FTT.³⁴ Similar to how FTT's fundamental value was tied to the existence of FTX, OXY's fundamental value was tied to the functioning of the Oxygen Protocol, as OXY's fundamental value derived from providing benefits to users of the Oxygen Protocol. To the extent the FTX collapse may have rendered the Oxygen Protocol defunct, it would also have eliminated the fundamental value of OXY.

15. In February 2021, Alameda led a \$40 million investment round into the Oxygen Protocol with the stated hope of integrating Oxygen into Maps.me.³⁵ Similar to Maps.me, Mr. Bankman-Fried was listed as an advisor to the Oxygen Protocol.³⁶ Consistent with the close

³⁰ Oxygen White Paper, p. 9; "Token," *Oxygen*, available at <https://www.oxygen.org/token.html>.

³¹ "Token," *Oxygen*, available at <https://www.oxygen.org/token.html>.

³² As of the writing of this report, the Oxygen Protocol's website still lists FTX in first place as a venue for purchasing OXY. "Token," *Oxygen*, available at <https://www.oxygen.org/token.html>. Further, the Oxygen Protocol's website regarding "staking" displays the following warning: "Due to the recent events involving FTX and uncertainty of pricing of some assets deposits are currently disabled. You can withdraw your assets if you have no borrows. We are working on enhancing the protocol to take into account the new information." See "Staking," *Oxygen*, available at <https://light.oxygen.org/staking>.

³³ "Token," *Oxygen*, available at <https://www.oxygen.org/token.html>.

³⁴ Howell Report, ¶ 43.

³⁵ Luo, Xinyi, "Tokens of Alameda-Backed DeFi Project Maps.me and Oxygen Locked Up at FTX," *CoinDesk*, November 15, 2022, available at <https://www.coindesk.com/business/2022/11/15/tokens-of-alameda-backed-defi-projects-mapsme-and-oxygen-locked-up-at-ftx/>.

³⁶ Oxygen White Paper, p. 10.

involvement of FTX and Alameda with OXY, data available to me indicate that as of the Petition Date, FTX and Alameda held over 97 percent of the maximum supply of OXY.³⁷ As of the Petition Date, less than one percent of the maximum supply of OXY was freely tradeable.³⁸ In the Howell Report, I estimated that the Debtors' holdings were equivalent to 5,769x the daily average trading volume of OXY. This means that even if one could have sold amounts equal to the average trading volume every single day, it would still take 16 years to sell off the Debtors' total holdings.³⁹ But liquidating the Debtors' holdings would therefore have quickly overwhelmed the available liquidity in the market for OXY. Using a formula from peer-reviewed literature on liquidation discounts, I estimated that OXY would have been subject to a 100 percent ALD.

C. SRM

16. The Serum exchange was created by Mr. Bankman-Fried together with associates at FTX and Alameda.⁴⁰ They established the Serum Foundation in 2020.⁴¹ SRM is a utility and governance token for the Serum exchange,⁴² which became defunct in November 2022 following

³⁷ See Workpaper 1. I understand that Debtors held both the native Solana chain OXY tokens and the ERC20 OXY tokens pertaining to 0x965697b4ef02f0de01384d0d4f9f782b1670c163 token contract address. Therefore, I calculate the maximum supply as the sum of maximum supplies of the two versions of the token.

³⁸ See Workpaper 1.

³⁹ Howell Report, ¶ 66.

⁴⁰ "What Is Serum? (SRM)," *Kraken*, available at <https://www.kraken.com/learn/what-is-serum-srm> ("Alameda Research, along with the FTX exchange, created Serum in 2020 and chose to build it on Solana. Sam Bankman-Fried, the founder of FTX and Serum, chose to build the decentralized exchange on Solana due to it allowing faster and cheaper transactions compared to other blockchains.").

⁴¹ Solana Foundation, "FTX Chooses Solana for Serum: A High-Speed, Non-Custodial Decentralized Derivatives Exchange," *Solana*, July 26, 2020, available at <https://solana.com/news/ftx-chooses-solana-for-serum--a-high-speed--non-custodial-decentralized-derivatives-exchange>; "Overview," *Project Serum*, available at <https://docs.projectserum.com/introduction/overview>.

⁴² "SRM Token," *Project Serum*, available at <https://docs.projectserum.com/introduction/srm-token>.

the collapse of FTX and Alameda.⁴³ Following the collapse of FTX and Alameda, several exchanges delisted SRM in 2022 and 2023, as I show in Exhibit 1.

17. The Serum exchange reportedly allowed traders to buy and sell cryptocurrencies in a “decentralized” manner.⁴⁴ SRM is a utility token whose characteristics are analogous to FTX’s FTT.⁴⁵ Similar to how FTT’s fundamental value was tied to the existence of FTX, SRM’s fundamental value was tied to the existence of the Serum exchange, as SRM’s fundamental value derived from providing benefits to users of the Serum exchange. These benefits included discounts on trading fees and interest on staked SRM, as well as participation in Serum revenues (68 percent of Serum trading fees were used to buy back and destroy (“burn”) SRM).⁴⁶

18. In addition to creating Serum, Sam Bankman-Fried was a public promoter of the Serum project.⁴⁷ Some analysts attributed the early success of the Serum project to its connection to Mr. Bankman-Fried, FTX, and Alameda.⁴⁸ As the founders of SRM, FTX and Alameda held

⁴³ Bannermanquist, Judith, “Serum exchange rendered ‘defunct’ following the collapse of Alameda and FTX,” *Cointelegraph*, November 29, 2022, available at <https://cointelegraph.com/news/serum-exchange-rendered-defunct-following-the-collapse-of-alameda-and-ftx>.

⁴⁴ Bannermanquist, Judith, “Serum exchange rendered ‘defunct’ following the collapse of Alameda and FTX,” *Cointelegraph*, November 29, 2022, available at <https://cointelegraph.com/news/serum-exchange-rendered-defunct-following-the-collapse-of-alameda-and-ftx>.

⁴⁵ Howell Report, ¶ 43.

⁴⁶ Project Serum, “SRM Unlock,” *Medium*, July 29, 2021, available at <https://projectserum.medium.com/srm-unlock-8e74f23d829f>.

⁴⁷ Sam Bankman-Fried appeared in introduction videos on the Serum website. “Media,” *Project Serum*, available at <https://docs.projectserum.com/appendix/videos-serum-academy>; Shifflett, Shane, Rob Barry, and Coulter Jones, “FTX Effort to Save Itself Failed on Questionable Assets,” *The Wall Street Journal*, December 5, 2022, available at <https://www.wsj.com/articles/ftx-effort-to-save-itself-failed-on-questionable-assets-11670245668> (“Mr. Bankman-Fried helped promote Serum... He hired at least one person to respond to Telegram messages where users discussed issues, while a public-relations firm that promoted FTX also helped market the new exchange, according to employees.”).

⁴⁸ Shen, Muyao, “Serum Token Becomes Latest Project in Bankman-Fried Empire to Turn Heads,” *CoinDesk*, April 28, 2021, available at <https://www.coindesk.com/markets/2021/04/28/serum-token-becomes-latest-project-in-bankman-fried-empire-to-turn-heads/> (“Some analysts have attributed the recent success of the Serum project and Solana blockchain to their association with Bankman-Fried, who garnered headlines recently for his \$135 million deal to name the basketball team Miami Heat’s home arena after the FTX exchange. According to a blog post last

over 95 percent of SRM's maximum supply,⁴⁹ equivalent to 394x the daily average trading volume of SRM. I understand that Mr. Bankman-Fried had broad discretion over updates to the SRM protocol and over the unlocking schedule of SRM for individual holders of the token on FTX.⁵⁰

19. As of the Petition Date, less than three percent of the maximum supply of SRM was freely tradeable.⁵¹ A number of observers have argued that when only a minuscule share of tokens are traded in markets (*i.e.*, a tiny circulating float), it is inappropriate to apply the market price to the remaining tokens that are locked up or otherwise not circulating.⁵² As a result, some public-facing data providers use the circulating float for their primary measure of market capitalization and offer "fully diluted market cap" as a secondary figure. For example, as of this writing

July, FTX and Alameda support Serum and choose Solana as its foundational blockchain. 'Traders perhaps saw Alameda Research-related names as safe havens' during last week's crypto-market sell-off, said Mira Christanto, a research analyst at Messari.'').

⁴⁹ See Workpaper 1. I understand that Debtors held both the native Solana chain SRM tokens and the ERC20 SRM tokens pertaining to 0x476c5e26a75bd202a9683ffd34359c0cc15be0ff token contract address. Therefore, I calculate the maximum supply as the sum of maximum supplies of the two versions of the token.

⁵⁰ See, e.g., Agarwal, Yash, "The forked Solana DEX Birthed from FTX's Death: The Openbook Deep Dive," *Medium*, January 15, 2023, available at <https://yashhsm.medium.com/the-forked-solana-dex-birthed-from-ftxs-death-the-openbook-deep-dive-cd81d909489b> ("The Serum program update key was not controlled by the SRM DAO, but by a private key connected to FTX."); Nelson, Danny, "FTX Hack Sparks Revolution at Serum DEX as Solana Devs Plot Alameda's Ouster," *CoinDesk*, November 12, 2022, available at <https://www.coindesk.com/business/2022/11/12/ftx-hack-spooks-solana-defi-community-igniting-revolution-at-alameda-controlled-serum-dex/> ("The true power over Serum rested with FTX Group, which continues to hold the program update authority keys, people familiar with the matter said."); Lewis, Michael, *Going Infinite: The Rise and Fall of a New Tycoon*, 1st ed., W.W. Norton, 2023, pp. 246-247 ("Soon after Serum's creation, its price had skyrocketed. [Mr. Bankman-Fried] clearly had not anticipated this. ... And so he did a very Sam thing: he changed the terms of the employees' Serum.").

Despite the fact that some SRM tokens were claimed to be locked, I understand from A&M that none of the Debtors' holdings of SRM are locked. See "SRM Token," *Project Serum*, available at <https://docs.projectserum.com/introduction/srm-token>.

⁵¹ See Workpaper 1.

⁵² Morris, David Z., "The FTX Collapse Looks an Awful Lot Like Enron," *CoinDesk*, November 16, 2022, available at <https://www.coindesk.com/layer2/2022/11/16/the-ftx-collapse-looks-an-awful-lot-like-enron/> ("[T]he value of any of those tokens reflected on Alameda or FTX's balance sheets were effectively fictional. Very, very fictional: a leaked FTX balance sheet claimed holdings of SRM worth \$2 billion dollars, when the entire market value of the token was \$88 million.").

CoinMarketCap reported the market cap for SRM as \$12.3 million, while the fully diluted market cap was reported as \$473 million.⁵³

20. In the Howell Report, using a formula from peer-reviewed literature on liquidation discounts, I conservatively estimated that in the event of an orderly liquidation of the Debtors' holdings commencing on the Petition Date, SRM would have been subject to a 58 percent ALD.⁵⁴

21. Since the Serum exchange is defunct and I am not aware of any expectations of a restart of the exchange, the fundamental value of SRM is likely negligible.⁵⁵ To the extent that the failure of the Exchanges and the accompanying fraud by the founders of Serum were likely to lead to winding down the Serum exchange, the fundamental value of SRM would have also been negligible as of the Petition Date, suggesting that the discounts for SRM presented in the Howell Report may be conservative.

IV. THE HOWELL REPORT USED APPROPRIATE, CONSERVATIVE MODEL INPUTS

22. Mr. Konstantinidis claims that the model inputs used in the Howell Report were selected inappropriately. In turn, Mr. Konstantinidis suggests alternative model inputs based on: (i) different estimation periods for the model inputs, (ii) different data sources for trading volume, and (iii) different sources of Petition Time prices. As I explain below, Mr. Konstantinidis' critiques

⁵³ "Serum (SRM)," *CoinMarketCap*, accessed February 9, 2024, available at <https://coinmarketcap.com/currencies/serum/>.

⁵⁴ Howell Report, Exhibit 3.

⁵⁵ On November 15, 2022, a "fork" of the Serum exchange called OpenBook was deployed. OpenBook uses the exact codes from the Serum exchange but without any ties to FTX. I understand that the new exchange did not use SRM as its governance and utility token as of January 2023. Agarwal, Yash, "The forked Solana DEX Birthed from FTX's Death: The Openbook Deep Dive," *Medium*, January 15, 2023, available at <https://yashhsm.medium.com/the-forked-solana-dex-birthed-from-ftxs-death-the-openbook-deep-dive-cd81d909489b>.

are generally misplaced and inapplicable. But applying the model inputs suggested by Mr. Konstantinidis most commonly either increases or leaves unchanged the resulting ALDs for the at-issue tokens, demonstrating that the model inputs used in the Howell Report are overall conservative in the context of discounting the prices of the at-issue tokens.

A. Estimation Period

23. In the Howell Report, I used the KO model to calculate the likely liquidation discounts assuming an orderly liquidation beginning on the Petition Date. The KO model requires an estimate of expected typical trading volume and volatility of the digital assets going forward from the Petition Date. While I take the Petition Date price as a required and assumed input, I make the conservative assumption that the liquidity of the market (*i.e.*, based on its volume and volatility) going forward from the Petition Date would not resemble the tumultuous days immediately leading up to the Petition Date but would instead resemble the period before the November 2, 2022 publication of the CoinDesk article⁵⁶ that cast doubt on the health of the Debtors' balance sheets.⁵⁷ I exclude the period after the November 2, 2022 CoinDesk article as I would not expect the elevated trading activity resulting from FTX's liquidity crisis following the article to be representative of trading activity going forward.

24. More generally, it is best practice to estimate average trading volumes and volatility over relatively longer time horizons to avoid idiosyncratic information events biasing the

⁵⁶ Allison, Ian, "Divisions in Sam Bankman-Fried's Crypto Empire Blur on His Trading Titan Alameda's Balance Sheet," *CoinDesk*, November 2, 2022, available at <https://www.coindesk.com/business/2022/11/02/divisions-in-sam-bankman-frieds-crypto-empire-blur-on-his-trading-titan-alamedas-balance-sheet>.

⁵⁷ This assumption is particularly reasonable for the at-issue tokens, of which Debtors held large quantities that would likely need to be liquidated over long time periods.

estimates.⁵⁸ Therefore, I estimated digital assets' expected trading volume and returns volatility based on their historical one-year averages in the year leading up to November 2, 2022.

25. Mr. Konstantinidis appears to critique the Howell Report for (i) excluding data after the November 2, 2022 CoinDesk article,⁵⁹ and (ii) not using a different estimation period, such as the six month period from May 11, 2022 to November 10, 2022.⁶⁰ In Figure 1, I show the ALDs that result for the at-issue tokens when I re-compute the model inputs based on either (i) the one-year period ending on November 10, 2022, or (ii) the six month period ending on November 10, 2022, as suggested by Mr. Konstantinidis. In both cases, ALDs for MAPS and OXY remain 100 percent, while the ALD for SRM increases from 58 percent to 63 percent and 64 percent, respectively.

Figure 1
ALDs Using Alternative Input Estimation Periods

	Estimation Period		Implied ALD		
	Start Date	End Date	MAPS	OXY	SRM
Howell Report	11/2/2021	11/1/2022	100%	100%	58%
One-year period ending November 10, 2022	11/11/2021	11/10/2022	100%	100%	63%
Six-month period ending November 10, 2022	5/11/2022	11/10/2022	100%	100%	64%

Notes and Sources:

[1] Implied ALD is calculated using the Howell Report methodology with given estimation period.

[2] See Howell Rebuttal Report backup.

⁵⁸ Average past trading volume may be a biased estimate of expected future trading volume in instances where there are strong time trends in the data. In Exhibit 2, I show the monthly trading volumes for each of the at-issue tokens in the year leading up to the CoinDesk article. As Exhibit 2 shows, there were no clearly discernible time trends in the trading volumes of the at-issue tokens prior to the Petition Date.

⁵⁹ Konstantinidis Report, ¶ 21.

⁶⁰ Konstantinidis Report, ¶ 22.

[3] The six-month period is suggested by Mr. Konstantinidis. *See* Konstantinidis Report, ¶ 22.

B. Trading Volume

26. It is commonly understood that due to the widespread nature of deceptive trade practices in digital asset markets, a large portion of the observed trading volume for digital assets may not reflect true, economically meaningful transactions between unrelated parties. (I discuss the underlying literature in detail below.) Such illusory trading volume would not be available to absorb the digital assets liquidated by the Debtors, and therefore should be excluded from the calculation of model inputs when analyzing ALDs or DLDM.

27. Because of these issues, it is important to evaluate the quality of the exchanges' trading data that are included in model input calculations. In the Howell Report, I generally relied on the trading data from exchanges supported by Coin Metrics, which uses a methodology explained in the Lu Declaration.⁶¹ These data include both exchanges that are in the "trusted volume" universe based on Coin Metrics' analyses (exchanges on which "most" volume is organic according to Coin Metrics' analyses), as well as a selection of additional digital asset exchanges whose trading volume data are less reliable.⁶² To the extent that including trading volume outside of Coin Metrics' trusted volume universe leads to an overestimation of trading volume, the ALDs in the Howell Report are conservative.⁶³ As I show below in Section IV.B.1, including only trading volume from the Coin Metrics trusted volume universe meaningfully increases the estimated ALD for SRM.

⁶¹ Declaration of Kevin Lu in Support of Motion of Debtors to Estimate Claims Based on Digital Assets, December 27, 2023 ("Lu Declaration"), ¶ 25.

⁶² Lu Declaration, Appendix B Coin Metrics Trusted Exchange Framework.

⁶³ Howell Report, ¶ 70.

1. *Purported Inconsistency with Lu Declaration*

28. Mr. Konstantinidis critiques the Howell Report for including *more* exchanges in estimating average daily trading volume for the at-issue tokens than does the Lu Declaration in determining Petition Time prices.⁶⁴ First, it is important to distinguish between two separate steps. One is to estimate Petition Time prices as reliably as possible. The second is to gather market data appropriate for calculating the ALD for the KO model. For this second step, I aimed to be more inclusive and maximize the number of assets for which a discount could be calculated, which would result in lower discounts on average and an available calculation for more assets. As discussed in the Howell Report, all else equal, higher trading volume due to the inclusion of more exchanges in the analysis leads to lower estimated KO discounts.⁶⁵ This is confirmed in Figure 2, which shows that relying on only the trusted volume universe used in the Lu Declaration to determine Petition Time prices would result in an ALD of 84 percent for SRM, which is 26 percentage points higher than the ALD estimated for SRM in the Howell Report. In both cases, the ALD is 100 percent for MAPS and OXY.

Figure 2
ALDs Using Trading Volume Data from Exchanges Used in Lu Declaration

	MAPS	OXY	SRM
Howell Report	100%	100%	58%
Exchanges used in Lu Declaration	100%	100%	84%

Notes and Sources:

[1] ALDs are calculated using the Howell Report methodology with trading volume data from a given set of exchanges.

[2] For MAPS, trading volume in the Howell Report is from the following 3 exchanges: Gate.io, FTX, MEXC. The Lu Declaration only includes 1 exchange: Gate.io.

⁶⁴ Konstantinidis Report, ¶ 25.

⁶⁵ Howell Report, ¶ 70.

[3] For OXY, trading volume in the Howell Report is from the following 5 exchanges: Gate.io, FTX, MEXC, Bitfinex, Kraken. The Lu Declaration only includes 3 exchanges: Gate.io, Bitfinex, Kraken.

[4] For SRM, trading volume in the Howell Report is from the following 18 exchanges: Bibox, Binance, Binance.US, Bitfinex, Bittrex, Bybit, CEX.io, Crypto.com, FTX, Gate.io, HitBTC, Huobi, Kraken, KuCoin, MEXC, OKX, Poloniex, Upbit. The Lu Declaration only includes 12 exchanges: Binance, Binance.US, Bitfinex, Bittrex, Bybit, Crypto.com, Gate.io, HitBTC, Huobi, Kraken, KuCoin, OKX.

2. *Expanding Data Sources as Suggested by Mr. Konstantinidis Would Be Inappropriate, and In Any Event Does Not Materially Change ALDs*

29. As noted above and discussed in the Howell Report, there is evidence that trading volumes of digital assets are often inflated due to widespread “wash trading” on even well-established exchanges.⁶⁶ Wash trading refers to transactions made with no market risk or real changes in the trader’s position, such as when an individual sells an asset to herself.⁶⁷ Wash trades create the appearance of higher volume, which can be helpful both for exchanges and for the owners or issuers of particular assets.⁶⁸ While wash trading in most assets is illegal in the U.S., digital asset markets are particularly susceptible to this practice due to limited regulatory oversight.⁶⁹

30. Academic literature and industry studies have demonstrated the prevalence of wash trading on crypto exchanges. For example, Cong et al. (2023) found that wash trading accounted for 70 percent of trading volume in four major crypto currencies on top exchanges not regulated

⁶⁶ Howell Report, ¶ 70.

⁶⁷ “Futures Glossary,” *Commodity Futures Trading Commission*, available at <https://www.cftc.gov/LearnAndProtect/AdvisoriesAndArticles/CFTCGlossary/index.htm#washtrading>.

⁶⁸ Cong, Lin William et al., “Crypto Wash Trading,” *Management Science*, Vol. 69, No. 11, 2023 (“Cong et al. (2023)”), p. 2 (“[B]ecause liquidity begets liquidity, crypto exchanges have strong economic incentives to inflate trading volumes to increase brand awareness and ranks on third-party aggregator websites or media (e.g., CoinMarketCap, CoinGecko, Bitcointalk, and Reddit), which, in turn, increases the exchanges’ profits from transaction fees.”).

⁶⁹ “Exercise Caution with Crypto Asset Securities: Investor Alert,” *U.S. Securities and Exchange Commission*, March 23, 2023, available at <https://www.sec.gov/oiea/investor-alerts-and-bulletins/exercise-caution-crypto-asset-securities-investor-alert>.

by the New York State Department of Financial Services.⁷⁰ Amiram et al. (2022) corroborated these findings using a larger population of digital assets and more recent trading data.⁷¹ Victor and Weintraud (2021) found evidence of wash trading on decentralized crypto exchanges.⁷² Other academic and industry studies have found evidence of wash trading using a range of data sources, including web traffic and user funds, account-level data, and off-chain and on-chain data.⁷³

31. Mr. Konstantinidis criticizes the Howell Report for exclusive reliance on Coin Metrics data and suggests the use of alternative data sources: CoinMarketCap, CoinGecko, or Coinpaprika.⁷⁴ Given the prevalence of wash trading in digital asset markets, including all trading volume reported for a digital asset by a data source would result in an inflated estimate of trading volume available to absorb the digital assets liquidated by the Debtors, and therefore would underestimate ALDs and DLOM.

32. Indeed, data aggregators such as the ones proposed by Mr. Konstantinidis as alternative data sources recognize this issue and have introduced “trust scores” and other metrics

⁷⁰ Cong et al. (2023), pp. 1-2, 4.

⁷¹ Amiram, Dan, Evgeny Lyandres, and Daniel Rabetti, “Cooking the Order Books: Information Manipulation and Competition among Crypto Exchanges,” *SSRN* 3745617, 2022, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3745617, pp. 7, 9.

⁷² Victor, Friedhelm and Andrea Marie Weintraud, “Detecting and Quantifying Wash Trading on Decentralized Cryptocurrency Exchanges,” *Proceedings of the Web Conference*, 2021, pp. 23-32. A 2023 study by Solidus Labs provides further evidence of wash trading on decentralized crypto exchanges. See “DEX Liquidity Providers Have Wash Traded More Than \$2 Billion to Date,” *Solidus Labs Research*, 2023, available at <https://www.soliduslabs.com/reports/crypto-wash-trading>.

⁷³ Aloosh, Arash and Jiasun Li, “Direct Evidence of Bitcoin Wash Trading,” *SSRN* 3362153, 2022, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3362153; Le Pennec, Guénolé, Ingo Fiedler, and Lennart Ante, “Wash Trading at Cryptocurrency Exchanges,” *Finance Research Letters*, No. 43, 2021; Chen, Jialan, Dan Lin, and Jiajing Wu, “Do Cryptocurrency Exchanges Fake Trading Volumes? An Empirical Analysis of Wash Trading Based on Data Mining,” *Physica A: Statistical Mechanics and its Applications*, No. 586, 2022; “Analysis of Real Bitcoin Trade Volume,” *Bitwise Asset Management*, March 19, 2019; Leccese, Andrea, “How Wash Trading Dominates the Crypto Market,” *Bluesky Capital*, July 2, 2021, available at <https://www.blueskycapitalmanagement.com/how-wash-trading-dominates-the-crypto-market/>.

⁷⁴ Konstantinidis Report, ¶ 23.

to partially address it.⁷⁵ Volume from exchanges with low “trust scores” can at least partially explain the increase in volume observed by Mr. Konstantinidis. For example, CoinMarketCap, CoinGecko, and Coinpaprika all provide SRM volume data from Bitay, an exchange which was rated 4.0/10 by CoinMarketCap based on factors that include “the Confidence that the volume reported by an exchange is legitimate.”⁷⁶ Other exchanges included in Mr. Konstantinidis’ volume calculations and flagged as providing potentially unreliable volume data by the data aggregators include BYDFi (rated 4.2/10 by CoinMarketCap and 5.0/10 by CoinGecko), FMFW.io (rated 4.9 by CoinMarketCap; rated 3.0/10 by CoinGecko and flagged to have recent anomalous SRM volume), Jubi (rated 4.0/10 by CoinMarketCap and unrated by CoinGecko), and NovaDAX (rated 4.3/10 by CoinMarketCap and 5.0/10 by CoinGecko), among others.⁷⁷

33. In Figure 3, I show the ALDs that result for the at-issue tokens when I re-compute the model inputs based on alternative data sources proposed by Mr. Konstantinidis.⁷⁸ Despite relying on trading volume estimates that are likely inflated, the alternative ALD estimates are similar to those calculated in the Howell Report. In particular, ALDs for MAPS and OXY remain 100 percent, while the ALD for SRM decreases to 42 percent when using CoinMarketCap or CoinGecko and increases to 64 percent when using Coinpaprika.

⁷⁵ “CoinGecko Introduces ‘Trust Score’ to Combat Fake Exchange Volume Data,” *CoinGecko*, May 13, 2019, available at <https://blog.coingecko.com/trust-score/>; “This is How Crypto Market Data Providers ‘Deflate’ Fake Trading Volumes,” *Cryptonews*, June 26, 2023, available at <https://cryptonews.com/exclusives/this-is-how-crypto-market-data-providers-deflate-fake-tradin-5256.htm>.

⁷⁶ “Top Cryptocurrency Spot Exchanges,” *CoinMarketCap*, accessed January 31, 2024, available at <https://coinmarketcap.com/rankings/exchanges/>.

⁷⁷ “Top Cryptocurrency Spot Exchanges,” *CoinMarketCap*, accessed January 31, 2024, available at <https://coinmarketcap.com/rankings/exchanges/>; “Top Crypto Exchanges Ranked by Trust Score,” *CoinGecko*, available at <https://www.coingecko.com/en/exchanges>.

⁷⁸ Konstantinidis Report, ¶ 23.

Figure 3
ALDs Using Trading Volumes Suggested by the Konstantinidis Report

Token	(Howell Report)				Solana
	CoinMetrics	CoinMarketCap	CoinGecko	Coinpaprika	Blockchain-Based
MAPS	100%	100%	100%	100%	100%
OXY	100%	100%	100%	-	100%
SRM	58%	42%	42%	64%	54%

Notes and Sources:

[1] ALDs are calculated using the methodology described in Section IV.A and Appendix C of the Howell Report.

[2] Coin Metrics data are sourced from the Howell Report backup. CoinMarketCap, CoinGecko, Coinpaprika, and Solana Blockchain-Based data are sourced from the Konstantinidis Report, ¶¶ 23-24.

[3] Average daily trading volumes for MAPS are: Coin Metrics: 510,221; CoinMarketCap: 1,822,603; CoinGecko: 2,207,060; Coinpaprika: 1,467,296; Solana Blockchain-Based: 1,790,766.

[4] Average daily trading volumes for OXY are: Coin Metrics: 1,731,954; CoinMarketCap: 3,762,560; CoinGecko: 3,616,875; Coinpaprika: no data; Solana Blockchain-Based: 3,319,249.

[5] Average daily trading volumes for SRM are: Coin Metrics: 25,221,283; CoinMarketCap: 48,773,498; CoinGecko: 48,680,976; Coinpaprika: 20,637,818; Solana Blockchain-Based: 29,888,903.

C. Petition Time Prices

34. Mr. Konstantinidis also criticizes the Petition Time prices used in the Howell Report as having been determined too close to the Petition Time.⁷⁹ Petition Time prices were determined by Mr. Lu based on prices in the 60 minutes leading up to the Petition Time, according to the detailed methodology outlined in the Lu Declaration.⁸⁰ Mr. Konstantinidis appears to suggest that basing Petition Time prices on prices in the 12 hours leading up to the Petition Time would have been more appropriate to “ensure that the cryptocurrency prices and volumes were not disproportionately affected by the actual filing of Chapter 11 petition.”⁸¹

35. In my opinion, Mr. Konstantinidis’ critique is without merit. As an initial matter, my assignment in the Howell Report was to estimate the prices at which the Debtors’ holdings of

⁷⁹ Konstantinidis Report, ¶ 26.

⁸⁰ Lu Declaration, ¶¶ 28-51.

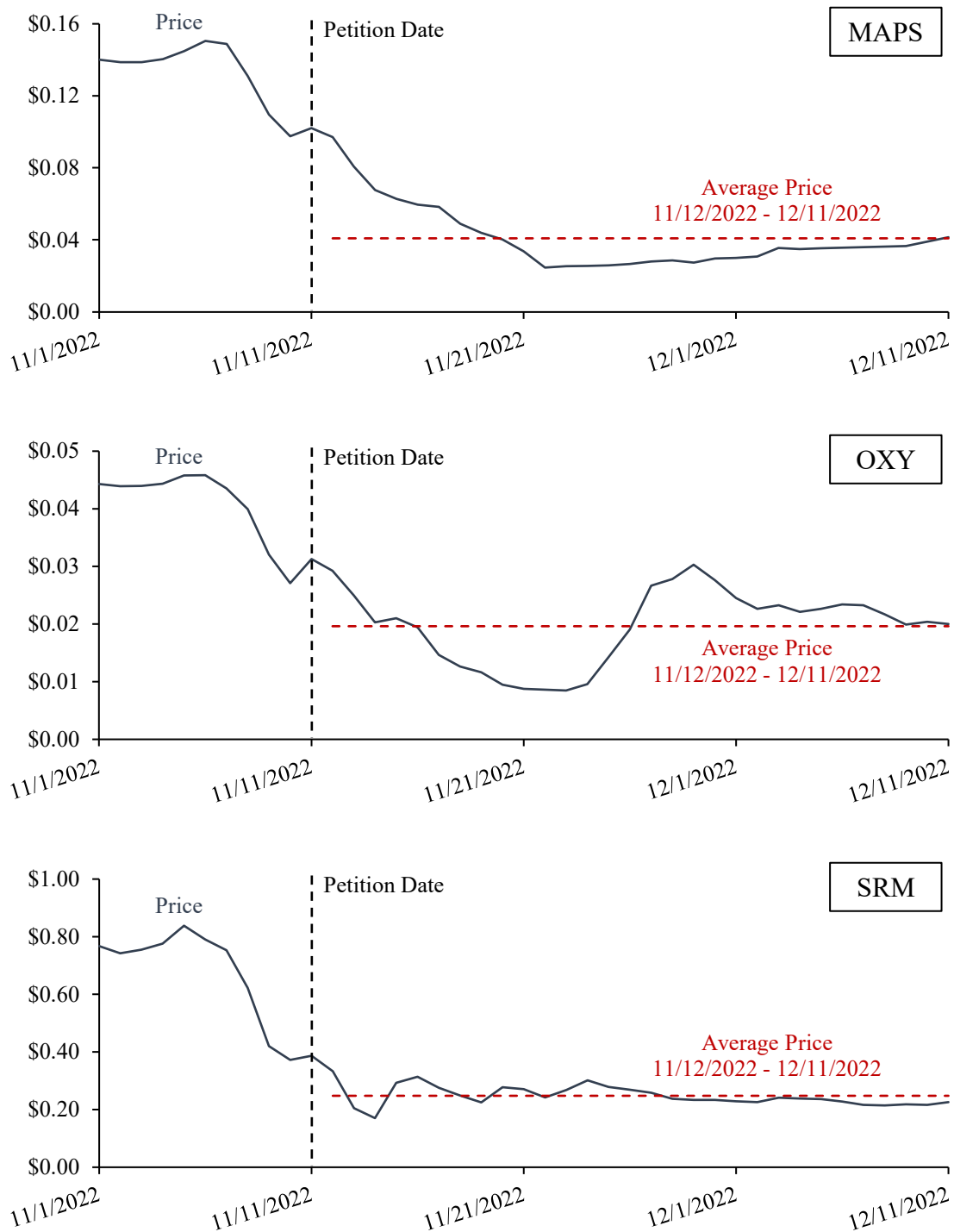
⁸¹ Konstantinidis Report, ¶ 26.

digital assets could be sold in an orderly liquidation commencing at the Petition Time.⁸² Such an exercise requires prices that are fully up to date as of the Petition Time, and reflect the reality of these Chapter 11 Cases to the fullest possible extent as of the Petition Time. Mr. Konstantinidis' proposal to rely on stale prices is therefore misguided in my opinion.

36. In fact, as I show in Figure 4, the prices of the at-issue tokens continued to decline after the Petition Date, suggesting that as of the Petition Date the market may not have fully reflected the impact of these Chapter 11 cases.

⁸² Howell Report, ¶ 4.

Figure 4
Evolution of Prices for MAPS, OXY and SRM Around the Petition Date



Source:

[1] Howell Report.

V. THE HOWELL REPORT’S APPLICATION OF THE KO MODEL TO ESTIMATE ALD IS APPROPRIATE

37. Mr. Konstantinidis raised several concerns about the Howell Report’s application of the KO model to estimate ALDs for digital assets. Below, I first explain that these critiques are either inapposite or mathematically incorrect. I then show that plausible alternative models of price impact would result in larger ALDs for the at-issue tokens and conclude that my use of KO to estimate ALDs is conservative.

A. The Critiques Raised by Mr. Konstantinidis Are Baseless and Misleading

1. Applying the KO Model Outside of Traditional Equity Markets Is Appropriate

38. Mr. Konstantinidis argues that there is no basis for applying the KO model to digital asset markets.⁸³ These critiques are unfounded.

39. First, academic research has shown that the KO model characterizes liquidity well in cryptocurrency markets such as those for BTC and ETH.⁸⁴ Second, the authors of KO, Albert Kyle and Anna Obizhaeva, have used the KO (2016) coefficients to characterize trading costs in settings that are quite different from stock markets in the early 2000s. Kyle and Obizhaeva used the same calibration in their study of Treasury and corporate fixed income securities,⁸⁵ notwithstanding that “[f]rom the perspective of market microstructure, bond markets differ from

⁸³ Konstantinidis Report, ¶¶ 31-32.

⁸⁴ Brauneis, Alexander et al., “How to Measure the Liquidity of Cryptocurrency Markets?” *Journal of Banking and Finance*, Vol. 124, 2021, pp. 1-26.

⁸⁵ Kyle, Albert S. and Anna A. Obizhaeva, “Trading Liquidity and Funding Liquidity in Fixed Income Markets: Implications of Market Microstructure Invariance,” *Working Paper*, 2016, available at <https://www.atlantafed.org/-/media/documents/news/conferences/2016/0501-financial-markets-conference/papers/kyle-trading-liquidity-and-funding-liquidity.pdf> (“Kyle and Obizhaeva (2016b)”).

equity markets in several ways.”⁸⁶ The authors also used the same calibration in their study of stock market crashes spanning the period 1929 to 2010, despite major changes in the functioning of financial markets over this time period.⁸⁷ In recent work, Kyle and Obizhaeva characterized the KO model as “a universal formula for market impact,” and argued that “the spirit of [the KO model] suggests that institutional details related to market structure, information asymmetries, or motivation of traders should not affect market impact estimates much.”⁸⁸ This universality implies that it is appropriate to use the coefficients that KO calibrated based on equity markets in other contexts as well, including cryptocurrency markets.

2. *Mr. Konstantinidis Misunderstands the Role of the Normalizing Constants in KO*

40. Mr. Konstantinidis’ attack of the coefficients used in the KO formula as “unsound” suggests he fails to understand the model. Specifically, Mr. Konstantinidis suggests the results are specific to an “imaginary stock” “with volatility of 2% per day, price \$40 per share and trading volume of 1 million shares per day.”⁸⁹ In fact, the normalizing constants based on this stock in the KO formula are immaterial to the workings of the model—they only serve to make the

⁸⁶ Kyle and Obizhaeva (2016b) show that the median daily volatility of Treasury bond returns is 0.5% while the median daily volatility of equity returns in Kyle and Obizhaeva (2016) is 1.9%, implying that the equity market is about 3.9 times as volatile as the Treasury bond market. In contrast, the median daily volatility of digital asset returns in the Howell Report is 6.7%, which is approximately 3.5 times higher than the volatility of the equity market. In this regard, the difference between the digital asset market and the equity market is similar to that of the equity market and the Treasury market. Likewise, the average daily volume of the Treasury market is more than 8,900 times larger than the median of the average daily volume in the equity market of Kyle and Obizhaeva (2016), while the median of the average daily volume of digital assets in the Howell Report is 0.3 times of that in the equity market in Kyle and Obizhaeva (2016). *See* Kyle and Obizhaeva (2016b), p. 17; Kyle and Obizhaeva (2016), Table 1, p. 1369.

⁸⁷ Kyle, Albert S. and Anna A. Obizhaeva, “Large Bets and Stock Market Crashes,” *Review of Finance*, Vol. 27, No. 6, 2023, pp. 2163-2203 (“Kyle and Obizhaeva (2023)”).

⁸⁸ Kyle and Obizhaeva (2023).

⁸⁹ Konstantinidis Report, ¶ 35.

interpretation of the regression coefficients easier for the paper's academic audience. An analogy would be to consider a model that predicts children's height in inches based on their age measured in number of days from birth, as in:

$$\text{Height_in_Inches} = a + b \times \text{Age_in_Days}.$$

In this model, the b coefficient represents the typical growth of a child from one day to the next. Such a coefficient would likely be minuscule and difficult to interpret in an intuitive manner. However, the same model could be equivalently re-cast by measuring age in years, as in:

$$\text{Height_in_Inches} = a + (365.25 \times b) \times \text{Age_in_Years}.$$

The two models are the same, with the only difference being a rescaling of the age variable and associated coefficient to ease interpretation. The normalizing constants in KO play the same role.

3. *Mr. Konstantinidis Misunderstands the Mathematics of the KO Formula*

41. Mr. Konstantinidis further demonstrates his lack of understanding of the KO model by stating that the resulting ALD can be negative.⁹⁰ This is incorrect, because for any positive price and holding value, the KO formula produces a positive value, which can be verified using basic algebra.⁹¹ Mr. Konstantinidis also critiques the model for producing discounts that are over 100 percent in extreme cases such as MAPS and OXY. Rather than demonstrating the inadequacy of the model, this merely shows the extreme lack of liquidity in the market for these tokens relative to the size of Debtors' holdings, as I also discussed in Section III.

⁹⁰ Konstantinidis Report, ¶ 35.

⁹¹ Mr. Konstantinidis notes that in the software code underlying my implementation of the KO model there is a line that ensures that the resulting discounts are between 0 and 100 percent. Had Mr. Konstantinidis paid more careful attention, he would have also realized that there are no instances where the code forces a negative value to 0. As noted above, negative values are a mathematical impossibility for positive holdings and price inputs to the KO formula.

4. *Likely Time Required to Liquidate the Debtors' Holdings*

42. Finally, Mr. Konstantinidis contends that the liquidation of MAPS, OXY, and SRM positions would not require a slow trading strategy.⁹² I disagree. Recall from Section III that the Debtors' holdings of each of the at-issue tokens comprise 95-99.8 percent of the token's maximum supply and represent hundreds or thousands of times daily trading volume. As I explained in the Howell Report, liquidating the Debtors' MAPS and OXY holdings would have required decades even under the unrealistic assumption that the Debtors could sell an amount equal to total daily volume *every day* for that whole period (in reality, such a strategy would quickly exhaust demand).⁹³

B. Robustness of ALD Estimates to Alternative Methodologies

43. The literature on ALDs more generally shows that my choice of the KO model for estimating ALDs is conservative, as other peer reviewed or widely used models of price impact result in substantially higher ALDs for the at-issue tokens. In Figure 5, I show ALDs for the at-issue tokens estimated based on: (i) the linear version of the KO model, (ii) the Amihud (2002) price impact model, (iii) the practitioner-oriented square-root model of price impact, and (iv) four additional models (Conv-N, Conv-V, Almgren-Chriss, and Frazzini-Israel-Moskowitz) used by Kyle and Obizhaeva (2023)⁹⁴ in their robustness tests. In all but one instance, alternative models produce ALDs that are higher than the ALDs I presented in the Howell Report for the at-issue tokens. Most alternative models indicate a 100 percent ALD for all at-issue tokens, including SRM.

⁹² Konstantinidis Report, ¶ 33.

⁹³ Howell Report, ¶ 66.

⁹⁴ Kyle and Obizhaeva (2023).

Figure 5
ALDs Using Different Models

Token	(Howell Report)	KO Linear	Amihud	Square-Root	Conv-N	Conv-V	Almgren-	Frazzini-
	KO Square-Root Model						Chriss	Israel-Moskowitz
MAPS	100%	100%	100%	100%	100%	100%	100%	100%
OXY	100%	100%	100%	100%	100%	100%	100%	100%
SRM	58%	100%	100%	54%	100%	100%	100%	100%

Notes and Sources:

[1] For each token, ALDs across different models are calculated using the following inputs: price and the Debtors' holdings as of the Petition Date, circulating supply as of the Petition Date, average daily trading volume and returns volatility during the estimation period from November 2, 2021 to November 1, 2022. *See* detailed formulas for each model in Appendix B.

[2] KO Square-Root Model is the model with square-root specification in Kyle and Obizhaeva (2016), which is the model the Howell Report applied.

[3] KO Linear Model is the model with linear specification in Kyle and Obizhaeva (2016).

[4] Amihud price impact model is from Amihud (2002). Amihud, Yakov, "Illiquidity and Stock Returns: Cross-Section and Time-Series Effects," *Journal of Financial Markets*, Vol. 5, No. 1, 2002, pp. 31-56.

[5] Square-Root model of price impact is defined as the returns volatility multiplied by the square-root of the ratio of liquidation amount over daily trading volume and divided by two. *See* Kyle and Obizhaeva (2023).

[6] Conv-N model is the conventional model based on market capitalization, used by Kyle and Obizhaeva (2023) for robustness tests. *See* Kyle and Obizhaeva (2023). I use the circulating supply of the at-issue tokens as their market capitalization.

[7] Conv-V is the conventional model based on daily volume, used by Kyle and Obizhaeva (2023) for robustness tests. *See* Kyle and Obizhaeva (2023).

[8] Almgren-Chriss model is used by Kyle and Obizhaeva (2023) for robustness tests. *See* Kyle and Obizhaeva (2023).

[9] Frazzini-Israel-Moskowitz model is used by Kyle and Obizhaeva (2023) for robustness tests. *See* Kyle and Obizhaeva (2023).

VI. THE HOWELL REPORT'S METHODOLOGY FOR ESTIMATING DLOM IS APPROPRIATE

A. The Critiques Raised by Mr. Konstantinidis Are Baseless and Misleading

1. Combining ALD and DLOM Is Reasonable

44. As an initial matter, the Howell Report only applies DLOM to non-marketable options on MAPS, OXY, and SRM, as well as LOCKED and CUSTOM versions of these tokens.⁹⁵

⁹⁵ Howell Report, ¶¶ 72-84. Mr. Konstantinidis mischaracterized the Howell Report, stating that "MAPS, OXY and SRM are categorized in the Howell Report as 'non-marketable digital assets.'" *See* Konstantinidis Report, ¶ 16. The Howell Report categorizes only LOCKED and CUSTOM versions of these tokens, as well as certain options on these tokens as non-marketable. Howell Report, ¶ 60.

These non-marketable claims represent 77 percent of the face value of the claims for MAPS, 77 percent for OXY, and 89 percent for SRM. It is well established that assets that are not immediately saleable are worth less than their counterparts that can be sold immediately. By extension, locked tokens are worth less than unlocked tokens. The percentage difference between the value of immediately marketable and non-marketable assets is represented by the DLOM.

45. Mr. Konstantinidis argues that “the two discounts [ALD and DLOM] cannot be applied at the same time.”⁹⁶ I disagree. In my analysis, the two discounts can be thought of as a two-step process. First, all the tokens need to be “unlocked” in order to be liquidated, which is implemented by applying the DLOM to the Petition Time price of the tokens. This adjustment to the value of claims based on digital assets reflects the pre-bankruptcy reality that locked tokens were worth less than their unlocked counterparts. Second, the ALD is applied to the Petition Time price for unlocked tokens and to the DLOM-adjusted Petition Time price for non-marketable tokens.⁹⁷

2. *Mr. Konstantinidis Appears to Misunderstand the DLOM Models He Uses*

46. Mr. Konstantinidis critiques my use of simulation methods to solve the Finnerty (2012) model to calculate DLOMs. Mr. Konstantinidis claims that (i) my simulations are “used to predict cryptocurrency prices” and that (ii) my simulations-based approach is invalid because the simulations “give completely inaccurate results when their output is compared against the actual

⁹⁶ Konstantinidis Report, ¶ 38.

⁹⁷ For non-marketable tokens, algebraically this can be expressed as follows. In the first step: (Unlocked Price) = (Petition Time Price) \times (1 - DLOM). In the second step: (Final Price) = (Unlocked Price) \times (1 - ALD). Since (Unlocked Price) = (Petition Time Price) \times (1 - DLOM), the combined expression is [(Petition Time Price) \times (1 - DLOM)] \times (1 - ALD). Multiplying the discounts is the correct way to do the calculation and results in a lower discount than if the ALD and DLOM were added together.

cryptocurrency prices they try to predict.”⁹⁸ These critiques are at odds with the modeling assumptions from the Chaffe (1993)⁹⁹ and Finnerty (2012)¹⁰⁰ DLOM models which Mr. Konstantinidis himself uses.

47. It is standard in financial economics to use simulation-based approaches to solving option-pricing models for which no exact (or “closed-form”) solution exists. For example, a recent academic paper solved a variant of the Finnerty (2012) model using a simulation approach similar to my methodology.¹⁰¹ Textbooks on option pricing also propose simulation-based approaches when closed-form solutions do not exist.¹⁰² In the Howell Report, I use a simulation-based approach for solving the Finnerty model,¹⁰³ as the solution formula suggested by Finnerty is based on an approximation that introduces bias for high-volatility assets such as the at-issue tokens.¹⁰⁴

48. Mr. Konstantinidis’ claim that the simulations are “used to predict cryptocurrency prices” is incorrect. In general, it is very difficult if not impossible to predict asset prices—if any

⁹⁸ Konstantinidis Report, ¶ 39.

⁹⁹ Chaffe, David B. H. III, “Option Pricing as a Proxy for Discount for Lack of Marketability in Private Company Valuations,” *Business Valuation Review*, 1993, pp. 182-188 (“Chaffe (1993)”).

¹⁰⁰ Finnerty, John D., “An Average-Strike Put Option Model of the Marketability Discount,” *Journal of Derivatives*, Vol. 19, No. 4, 2012, pp. 53-69 (“Finnerty (2012)”).

¹⁰¹ Abudy, Menachem, Hadar Binsky, and Alon Raviv, “The Effect of Liquidity on Non-Marketable Securities,” *Finance Research Letters*, Vol. 26, 2018, pp. 139-144, Figure 1 and p. 142 (“Since there is no closed-form solution for the pricing equations, we solve them by using a Monte Carlo simulation.”).

¹⁰² See, e.g., Sundaram, Rangarajan and Sanjiv Das, *Derivatives: Principles and Practice*, 2nd ed., McGraw Hill Education, 2016, p. 479 (“In particular, closed form solutions are not available for Asian option prices. One common solution to this problem is to use numerical techniques such as Monte Carlo simulation to identify the option price.”).

¹⁰³ See Howell Report, Appendix C for a detailed description of my simulation approach.

¹⁰⁴ Finnerty (2012), p. 55 (“The payoff function in Equation (7) contains the sum of a set of correlated log-normal random variables. Although expressions exist for the moment-generating function, mean, and variance of the sum of two lognormal random variables, no exact closed-form expression for the density function of the sum of a set of lognormal random variables is known. ... I use Wilkinson’s method to approximate the distribution”).

investor could do so, he could earn very large profits.¹⁰⁵ The assumption that prices are generally unpredictable is fundamental to option pricing models, including the Chaffe (1993) and Finnerty (2012) models used by Mr. Konstantinidis. The purpose of the simulations is therefore not to “predict” prices, but rather to model ranges of plausible future outcomes as of the Petition Date.

49. Mr. Konstantinidis’ critique that the simulations are invalid because the averages of the simulated prices deviate from the observed *ex post* prices of the at-issue assets is similarly incorrect.¹⁰⁶ From the perspective of the asset pricing model underpinning the option pricing models used by both me and Mr. Konstantinidis, actual prices are merely one realization of the model, *not* the average outcome. As I show in Exhibit 3, individual series of simulated prices for the at-issue tokens often show large deviations from the average, just as Mr. Konstantinidis claims actual digital asset prices deviated from the simulated average.¹⁰⁷

50. More broadly, the characteristics of simulated prices derive from the asset pricing model used to generate them. My simulations model digital asset prices as a geometric Brownian motion (“GBM”) process.¹⁰⁸ The assumption that prices evolve according to a GBM process

¹⁰⁵ This fundamental idea of financial economics is also known as the “Efficient Markets Hypothesis.” Fama, Eugene F., “Efficient Capital Markets: A Review of Theory and Empirical Work,” *Journal of Finance*, Vol. 25, No. 2, 1970, pp. 383-417.

In a 2011 survey of prominent academic economists, 100 percent of respondents agreed with the statement that “Unless they have inside information, very few investors, if any, can consistently make accurate predictions about whether the price of an individual stock will rise or fall on a given day.” “Stock Prices,” *University of Chicago Booth School of Business Kent A. Clark Center for Global Markets*, October 31, 2011, available at <https://www.kentclarkcenter.org/surveys/stock-prices/>.

¹⁰⁶ Konstantinidis Report, ¶ 39. *See also* MAPS 0001252.XLSX.

¹⁰⁷ The “MAPE” metric calculated by Mr. Konstantinidis is the average absolute percentage deviation of the price series from the average simulated value. In each panel of Exhibit 3, the grey lines represent five iterations of the model, showing potential price paths that could arise from the model, along with the MAPE value associated with each simulated price path.

¹⁰⁸ Intuitively, the GBM process assumes that while prices on average tend to grow by a certain modest amount, they can at any given moment move up or down by an unpredictable amount governed by the assumed volatility of

underpins significant portions of modern finance theory.¹⁰⁹ The GBM assumption is especially widespread in option pricing theory, including in the Black-Scholes model,¹¹⁰ as well as the Chaffe (1993)¹¹¹ and Finnerty (2012)¹¹² DLOM models, which are the two DLOM models used by Mr. Konstantinidis.¹¹³ Therefore, Mr. Konstantinidis' critique that prices simulated according to a GBM process "cannot accurately capture the complexities of ... cryptocurrency prices" is tantamount to a critique that the Chaffe or Finnerty models cannot be used for calculating DLOM, even though those models are precisely what Mr. Konstantinidis uses in his valuation analysis.

B. The Howell Report DLOM Estimates Fall Between the DLOM Estimates From the Two Models Used by Mr. Konstantinidis for Time Horizons Under 7 Years

51. Setting aside the disputes about methodology discussed above, it is worth noting that *for the time horizons relevant to the Howell Report*, the DLOM values generated by the simulation based DLOM methodology I used in the Howell Report fall between the range of

asset prices. Mathematically, the prices are modeled to evolve over a period of τ as $\frac{P_\tau}{P_0} = \exp\left(\left(\mu - \frac{\sigma^2}{2}\right)t + \sigma W_t\right)$, where μ is the drift term representing compensation for bearing risk, σ is the idiosyncratic volatility of asset returns, and W_t is a white noise component also referred to as Brownian motion. *See, e.g.,* Øksendal, Bernt, *Stochastic Differential Equations*, 6th ed., 2013, Springer, p. 66, equation. 5.1.5; Back, Kerry E., *Asset Pricing and Portfolio Choice Theory*, 2nd ed., Oxford University Press, 2017, pp. 303-304.

¹⁰⁹ *See, e.g.,* Cochrane, John, *Asset Pricing*, Revised ed., Princeton University Press, 2005, p. 493; Back, Kerry E., *Asset Pricing and Portfolio Choice Theory*, 2nd ed., Oxford University Press, 2017, p. 303 ("[Geometric Brownian Motion] is a relatively simple but fairly standard model of a stock price."); Duffie, Darrell, *Dynamic Asset Pricing Theory*, 3rd ed., Princeton University Press, 2001, p. 88 ("[A] geometric Brownian motion is a natural two-parameter model of a security-price process...").

¹¹⁰ Black, Fischer, and Myron Scholes, "The Pricing of Options and Corporate Liabilities," *Journal of Political Economy*, Vol. 81, No. 3, 1973, pp. 637-654 ("Black and Scholes (1973)").

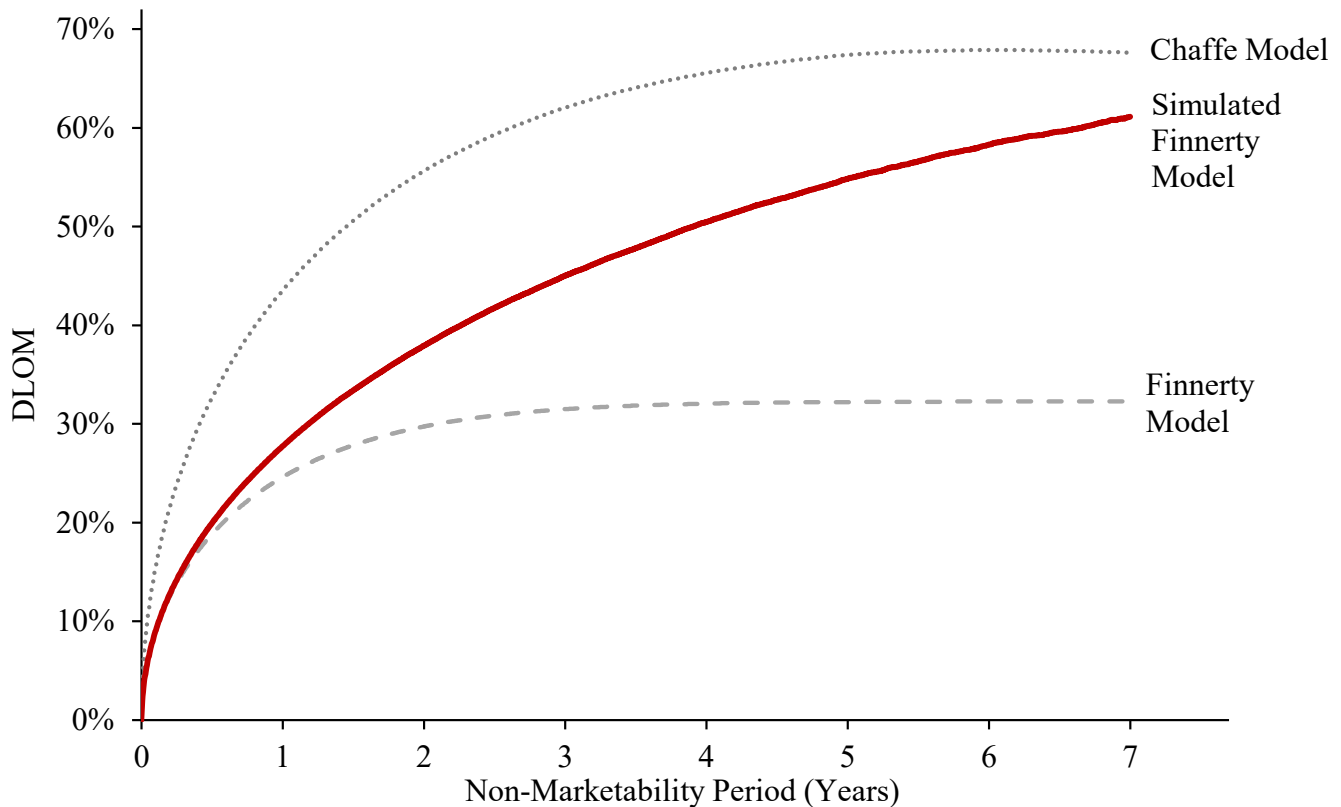
¹¹¹ Chaffe (1993) uses the Black-Scholes formula for calculating the DLOM as the value of a put option. Black-Scholes rely on the assumption that stock prices follow a GBM process.

¹¹² Finnerty (2012), p. 54, assumption A4.

¹¹³ Konstantinidis Report, ¶¶ 43-44.

DLOM values generated by the Chaffe and Finnerty models that Mr. Konstantinidis averages in his methodology.¹¹⁴ I illustrate the DLOM values generated by these models in Figure 6.

Figure 6
DLOM Indicated by Different Models
(For an Asset with 125 Percent Annualized Volatility)



Notes and Sources:

- [1] Chaffee, David B. H. III, "Option Pricing as a Proxy for Discount for Lack of Marketability in Private Company Valuations," *Business Valuation Review*, December 1993, pp. 182-188.
- [2] Finnerty, John D., "An Average-Strike Put Option Model of the Marketability Discount," *Journal of Derivatives*, Vol. 19, No. 4, 2012, pp. 53-69.
- [3] See Howell Report, Appendix C for details on the implementation of the Simulated Finnerty Model.
- [4] The results shown in this Figure assume annualized return volatility of 125%. The annualized return volatilities (based on the estimation period used in the Howell Report) of MAPS, OXY, and SRM were 142%, 133%, and 104%, respectively. I show the DLOM curves for each of the at-issue tokens in Exhibit 4.

¹¹⁴ As I discuss in detail in Section VII.E, the Chaffe and Finnerty models perform poorly at longer time horizons.

VII. MR. KONSTANTINIDIS RELIES ON A FLAWED METHODOLOGY AND REACHES UNSUPPORTABLE CONCLUSIONS

52. In Figure 7, I summarize the discounts Mr. Konstantinidis calculates for different customers' claims for the at-issue tokens. Depending on the customer, Mr. Konstantinidis' discounts range from 43.2 percent to 45.4 percent for MAPS, from 35.8 percent to 36.9 percent for OXY, and from 45.9 percent to 46.0 percent for SRM.

Figure 7
Summary of Mr. Konstantinidis' Discounts for At-Issue Tokens

	MAPS	OXY	SRM
Maps Vault Ltd.	45.4%		46.0%
Oxygen Vault Ltd.		36.9%	45.9%
Fondation Elements		36.4%	
Fondation Serendipity	43.2%	35.8%	

Sources:

[1] Konstantinidis Report, ¶ 49.

[2] Konstantinidis Supplemental Report, ¶ 24.

53. As a threshold matter, by presenting alternative discounts, Mr. Konstantinidis is not arguing that no discounts are applicable to the prices of the at-issue tokens. In this section, I first provide an overview of Mr. Konstantinidis' methodology. I then discuss in detail why key elements of Mr. Konstantinidis' methodology are fundamentally flawed. I also show that the flaws in Mr. Konstantinidis' methodology serve to systematically bias the estimated discounts downward.

A. Overview of Mr. Konstantinidis' Methodology

54. Mr. Konstantinidis' methodology can be summarized in the following steps.

- i. Mr. Konstantinidis assumes that the 24-hour trading volume leading up to the Petition Time of the at-issue tokens, as provided by CoinMarketCap, is representative of the typical baseline trading volume of the at-issue tokens.
- ii. Mr. Konstantinidis extrapolates the baseline trading volume from step (i) by assuming that those trading volumes in the year after the Petition Date would increase by over 850 percent for MAPS and OXY, and by over 20 percent for SRM. In years thereafter, he proposes that the trading volumes would continue to increase, but by smaller amounts.
- iii. Mr. Konstantinidis assumes that each customer could liquidate up to 10 percent of the daily trading volume of each token without any price impact.
- iv. Using the above assumptions, Mr. Konstantinidis creates a liquidation schedule for each customer such that the customer's trades would not exceed 10 percent of extrapolated trading volume on any given day.
- v. Lastly, Mr. Konstantinidis calculates the DLOM applicable for the average duration of each customer's hypothetical liquidation schedule.

55. Below, I show that each step of Mr. Konstantinidis' methodology is flawed and serves to systematically bias his results toward finding unrealistically low discounts for the at-issue tokens.

B. Mr. Konstantinidis' Trading Volume Is Inflated

56. Mr. Konstantinidis' trading volume is inflated by using too high an estimate of "baseline" trading volume and by further growing the trading volume to unsupportable levels.

57. When new information arrives in a market, participants react by buying and selling, creating higher trading volume and leading to a new price that reflects the news.¹¹⁵ Major news events therefore tend to be associated with spikes in trading volumes, which then dissipate after the market digests the news. However, predicting the *expected* level of future trading activity based on trading volume observed during a major news event would be a mistake: in the future, major news will not come to the market *every day*. Therefore, extrapolating future trading volume based on trading volume *from a single day* on which a major news event occurred will inflate the extrapolated future trading volume.

58. The first step of Mr. Konstantinidis' methodology makes exactly this mistake. The impending collapse of the FTX Exchanges in the run-up to the Petition Date was a major news event associated with abnormally high trading volume, especially for the at-issue tokens, each of which were closely associated with FTX and Mr. Bankman-Fried, as I described in Section III.¹¹⁶ Yet Mr. Konstantinidis uses the trading volume from the 24 hours leading up to the Petition Time for setting a baseline expectation for the future.¹¹⁷ In effect, Mr. Konstantinidis therefore assumes

¹¹⁵ For example, trading volume typically increases sharply around earnings announcement dates in conventional equity markets. *See, e.g.,* Lamont, Owen and Andrea Frazzini, "The Earnings Announcement Premium and Trading Volume," *NBER Working Paper*, No. 13090, 2007, Abstract ("volume surges around announcement dates"); Barber, Brad M. et. al., "The Earnings Announcement Premium Around the Globe," *Journal of Financial Economics*, Vol. 108, 2013, pp. 118-138, Figure 3B. Research has also found that the size of the volume reaction is related to the information content of announcements, as well as the dispersion in investor beliefs. *See* Bamber, Linda Smith, "Unexpected Earnings, Firm Size, and Trading Volume around Quarterly Earnings Announcements," *The Accounting Review*, Vol. 62, No. 3, 1987, pp. 510-532; Bamber, Linda Smith, Orie E. Barron, and Thomas L. Stober, "Trading Volume and Different Aspects of Disagreement Coincident with Earnings Announcements," *The Accounting Review*, Vol. 72, No. 4, 1997, pp. 575-597; Bamber, Linda Smith, Orie E. Barron, and Thomas L. Stober, "Differential Interpretations and Trading Volume," *Journal of Financial and Quantitative Analysis*, Vol. 34, No. 3, 1999, pp. 369-386.

¹¹⁶ Exhibit 5 illustrates the volatility of the daily trading volume in the six months leading up to the Petition Date for MAPS, OXY, and SRM. This emphasizes the inappropriateness of projecting trading volumes based on a single day of trading.

¹¹⁷ As shown in Exhibit 6, the trading volume from the 24 hours leading up to the Petition Time is 307 percent higher than the average daily trading volume for the twelve months leading up to the November 2, 2022 CoinDesk article for MAPS, 80 percent higher for OXY, and 1,408 percent higher for SRM.

that after the Petition Date, every day would involve a news event as significant as the Debtors' ongoing liquidity crisis in the immediate run-up to the Petition Time.

59. Having established an inflated baseline level of trading volume for the at-issue tokens, Mr. Konstantinidis proceeds to extrapolate these trading volumes into the future using arbitrary and inflated assumptions about their future growth rates. As a result, Mr. Konstantinidis' projections of future trading volumes for the at-issue tokens are unrealistically large.

60. The at-issue tokens were all closely tied to FTX and Mr. Bankman-Fried and were therefore adversely affected by the collapse of the Exchanges and the accompanying revelation of fraud at FTX. All else equal, this should reduce future investor interest and trading activity in the at-issue tokens.¹¹⁸

61. Despite the close links of these projects to FTX, Alameda, and Mr. Bankman-Fried, Mr. Konstantinidis assumes that in the year after the Petition Date, the trading volumes of both MAPS and OXY would both increase by over 850 percent and the trading volume of SRM would increase by over 20 percent, as I illustrate in Figure 8. Mr. Konstantinidis arrives at these growth rates by analyzing the trading volume patterns of a set of supposedly "peer" tokens¹¹⁹ that were

¹¹⁸ Consistent with this observation, Binance began a process of delisting SRM in November 2022, noting that "the fallout from FTX's collapse continues" and that SRM "was championed by FTX since its inception." "Crypto Exchange Binance Delists Serum Trading Pairs Amid FTX Connection," *Binance Square*, November 25, 2022, available at <https://www.binance.com/en/feed/post/90475>.

¹¹⁹ Mr. Konstantinidis derives the projected rate of increase in trading volume for the at-issue tokens based on the historical growth in trading volume of 20 purported peer tokens. These purported peer tokens were supposedly selected based on four criteria. These four criteria include digital assets that "are available in the Ethereum blockchain, were active for the last 5 years, were not stablecoins, and had average daily volume in USD between \$1 million - \$30 million[.]" Konstantinidis Report, ¶ 46.

Specifically, Mr. Konstantinidis calculates average daily volume for each calendar year and peer. He then uses the average daily volume for each year to calculate annual growth rates for each peer. He then averages the growth rate by age across peers and applies the growth rate to MAPS, OXY, and SRM for their corresponding age. See MAPS 0000001.XLSX.

both (i) unaffiliated with FTX and Mr. Bankman-Fried and therefore not directly affected by these Chapter 11 Cases, and (ii) generally bear little resemblance to the at-issue tokens.¹²⁰

Figure 8
Year-on-Year Growth in Trading Volumes Assumed by Mr. Konstantinidis

Date	MAPS	OXY	SRM
11/11/2023	857.1%	857.1%	20.9%
11/11/2024	20.9%	20.9%	4.5%
11/11/2025	4.5%	4.5%	7.1%
11/11/2026	7.1%	7.1%	0.0%
11/11/2027	0.0%	0.0%	0.0%
11/11/2028	0.0%	0.0%	0.0%
11/11/2029	0.0%	0.0%	0.0%
11/11/2030	0.0%	0.0%	0.0%

Source:

[1] MAPS 0000479.XLSX.

62. As I show in Figure 9, Mr. Konstantinidis projects trading volumes for MAPS and OXY to explode following the Petition Date, and projects trading volumes for SRM to remain sustainably elevated.¹²¹ I note that the projected increases in investor interest in MAPS, OXY and SRM are against a pre-Petition Date baseline in which Mr. Bankman-Fried was actively promoting the at-issue tokens. In my view, Mr. Konstantinidis' projected large increases in average daily trading volume despite the collapse of FTX are unrealistic.

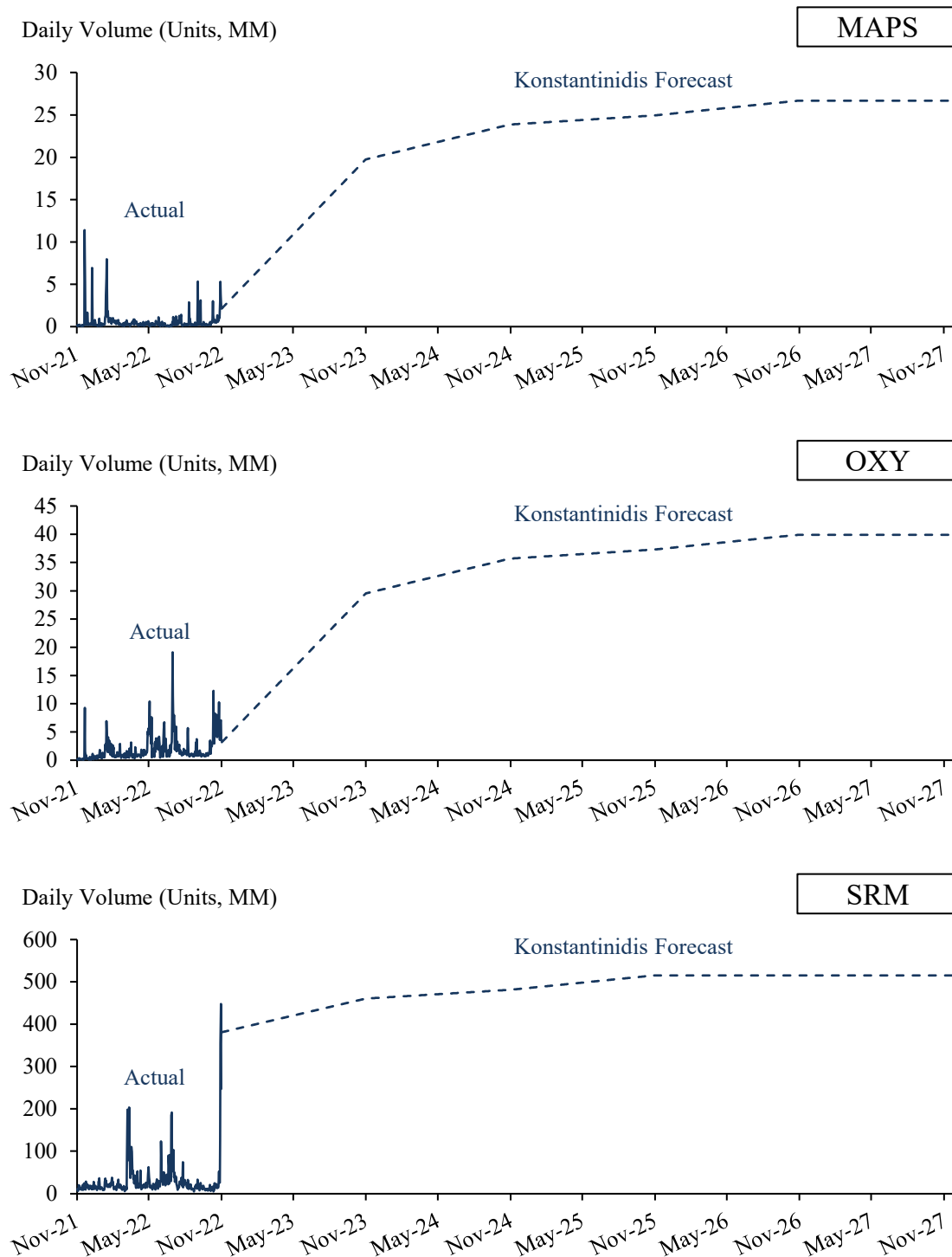
63. Mr. Konstantinidis' projected daily volumes also do not pass the reasonableness check of being compared to realized post-Petition Date volumes. As I show in Exhibit 8, the trading

¹²⁰ For example, Mr. Konstantinidis includes gold-pegged stablecoins PAXG and XAUT as "peer" tokens, even though his selection criteria purportedly exclude stablecoins. *See* MAPS 0000001.XLSX.

¹²¹ Because the trading volume growth rates of the peers selected by Mr. Konstantinidis are highly variable, the projected average growth rates calculated by Mr. Konstantinidis shown in Figure 8 are highly sensitive to outliers. If one were to calculate the median instead of average growth rate (as the median is generally more robust to outliers), the resulting projected growth rates would have been far lower. *See* Exhibit 7.

volumes projected by Mr. Konstantinidis exceeded actual trading volume for all three of the at-issue tokens by wide margins in the year following the Petition Date. The difference between projected and actual trading volumes increased as more time elapsed from the Petition Date. As of October 2023, projected trading volumes were 1,319 percent, 906 percent, and 779 percent larger than actual trading volumes for MAPS, OXY and SRM, respectively.

Figure 9
Historical and Projected Trading Volumes for At-Issue Tokens, 2021-2027



Notes and Sources:

[1] Actual daily volume data from Howell Report.

[2] Konstantinidis Forecast from "MAPS 0000479.XLSX."

C. Mr. Konstantinidis’ Assumption That 10 Percent of Trading Volume Could Be Liquidated Every Day for Several Years Is Unreasonable

64. As an initial matter, even though Mr. Konstantinidis’ stated assumption is that trades up to 10 percent of trading volume do not affect prices, Mr. Konstantinidis in fact assumes that *each individual customer* can trade up to 10 percent of the market volume of each token without any price impact. As I show in Figure 10, this means that in aggregate, customers in Mr. Konstantinidis’ methodology would be liquidating more than 10 percent of volume for several years. Specifically, Mr. Konstantinidis’ methodology effectively assumes that an amount close to 30 percent of the at-issue tokens’ trading volume can be liquidated *every day* without any price impact.

Figure 10
Asset Liquidations as a Fraction of Trading Volume in Mr. Konstantinidis’ Model

Year Ending:	MAPS			OXY			
	Maps Vault	Fondation Serendipity	Total	Oxygen Vault	Fondation Elements	Fondation Serendipity	Total
11/11/2023	10%	10%	20%	10%	10%	8%	28%
11/11/2024	10%	9%	19%	10%	5%	2%	17%
11/11/2025	10%	3%	13%	6%	3%	2%	10%
11/11/2026	10%	3%	13%	4%	3%	1%	8%
11/11/2027	9%	3%	12%	0%	0%	0%	1%
11/11/2028	1%	0%	1%	0%	0%	0%	0%

Sources:

[1] MAPS 0000479.XLSX.

[2] Duration Analysis - All Tokens (Fondation Entities).xlsx.

[3] “Total” refers to the total average percentage of daily volume of each token liquidated across all entities under Mr. Konstantinidis’ methodology.

65. Perhaps more importantly, Mr. Konstantinidis’ assertion that it would be possible to sell 10-30 percent of trading volume *every day* for *years* without having *any* impact on the market price is unfounded. Both financial economics and simple common sense suggest that such

an aggressive, persistent pattern of selling would lead to an evaporation of liquidity in the market.¹²² As explained by Perold (1988): “Think of the block trader who has to find the other side of the trade for you. If you often show up with ‘soiled merchandise,’ he is going to go out of business if he always accommodates you at current prices and bags his clients on your behalf. More likely he will adjust the price somewhat.”¹²³

66. Even if selling 10 percent of trading volume moves the market price by only a small amount, as suggested by Mr. Konstantinidis, the cumulative price decrease over long periods can be large because the discounts compound. For example, a daily price decrease of 0.1 percent due to the price impact of selling 10 percent of volume would compound to a 31 percent discount over the course of a year.¹²⁴ Similarly, a daily price decrease of 0.2 percent would compound to a 52 percent decrease over the course of a year. The KO model implies that daily sales of 10 percent trading volume would be associated with approximately 1.9 percent price impact for MAPS, 1.8 percent for OXY, and 1.3 percent for SRM.¹²⁵ On an annualized basis, these daily price impacts compound to 100 percent for MAPS, 100 percent for OXY, and 99 percent for SRM.¹²⁶ These calculations indicate that Mr. Konstantinidis substantially underestimates applicable discounts by ignoring the price impact of liquidation.

¹²² See, e.g., Kyle and Obizhaeva (2023) (“Even in highly liquid markets and even if quantities traded are restricted to 5% or 10% of daily volume, execution of large bets may lead to significant price changes.”).

¹²³ Perold, Andre F., “The Implementation Shortfall: Paper Versus Reality,” *The Journal of Portfolio Management*, Vol. 14, No. 3, 1988, pp. 4-9, p. 6. Perold (1998) also stated in the same page that: “Once you have traded, the price may not return to its previous level because the cat is now out of the bag. In that case, part of the price impact will be permanent.”

¹²⁴ Calculated as $1 - (1 - 0.1\%)^{365.25}$.

¹²⁵ The price impact component of the KO formula is multiplied by two to infer the price impact, as in Kyle and Obizhaeva (2023). The permanent price impact on each day is assumed to be 72% of the model-implied price impact, following Table 1 of Keim, Donald B. and Ananth Madhavan, “The Upstairs Market for Large-Block Transactions: Analysis and Measurement of Price Effects,” *Review of Financial Studies*, Vol. 9, No. 1, 1996, pp. 1-36.

¹²⁶ Calculated as $1 - (1 - \text{daily percent price impact})^{365.25}$.

D. Mr. Konstantinidis' Methodology Would Require the At-Issue Tokens to Be Liquidated Over Decades or More Under Reasonable Model Inputs

67. According to Mr. Konstantinidis' methodology, the claims based on the at-issue tokens for Maps Vault Ltd., Oxygen Vault Ltd., Fondation Elements, and Fondation Serendipity, would be liquidated in four to five years.¹²⁷ Mr. Konstantinidis obtains such compressed projected liquidations due to his inflated assumptions of baseline and projected trading volumes, among other reasons. As I show in Figure 11, when Mr. Konstantinidis' flawed trading volume assumptions are corrected to be consistent with the at-issue tokens' average trading volumes in the year prior to November 2, 2022, under his methodology individual customer claims would take as long as 211 years to liquidate for MAPS, 49 years for OXY, and 5 years for SRM.¹²⁸

68. As explained in the Howell Report and the Howell Supplemental Declaration, in this case the relevant issue is the time to liquidate *all* of the Debtors' holdings, not just the ones on which certain customers' claims are based.¹²⁹ According to Mr. Konstantinidis' methodology and model inputs, liquidating the Debtors' holdings would take 11 years for MAPS, 8 years for OXY, and less than a year for SRM.¹³⁰ However, applying more realistic trading volume inputs to Mr. Konstantinidis' methodology implies that liquidating the Debtors' holdings of MAPS and OXY would take hundreds of years, and liquidating the Debtors' holdings of SRM would take just under 11 years (Figure 11, bottom row).

¹²⁷ Exhibit 9. *See also* MAPS 0000479.XLSX; Duration Analysis - All Tokens (Fondation Entities).xlsx.

¹²⁸ I show additional detail underlying these calculations in Exhibit 9.

¹²⁹ Howell Report, ¶ 4; Howell Supplemental Declaration, ¶¶ 11-14.

¹³⁰ Exhibit 9.

Figure 11
Years Required to Liquidate the At-Issue Tokens in Mr. Konstantinidis' Methodology
With Corrected Trading Volume Inputs

<u>Liquidating Entity</u>	<u>MAPS</u>	<u>OXY</u>	<u>SRM</u>
Maps Vault, Ltd.	210.6	-	4.8
Oxygen Vault, Ltd.	-	49.2	4.8
Fondation Serendipity	107.4	15.8	-
Fondation Elements	-	31.6	-
Debtor	541.1	158.0	10.8

Notes and Sources:

[1] Exhibit 9.

[2] I calculate time to liquidate using pre-Petition Date historical average trading volumes from the Howell Report throughout the liquidation period. I otherwise apply Mr. Konstantinidis' methodology unchanged.

E. Using an Appropriate DLOM Model and Corrected Trading Volume, Mr. Konstantinidis' Methodology Results in Higher Discounts Than Those Presented in the Howell Report

69. In this section, I show more comprehensively that correcting Mr. Konstantinidis' approach for the at-issue tokens leads to discounts that are either consistent with or higher than the discounts I presented in the Howell Report. The needed corrections are to (i) adjust trading volume inputs; (ii) choose a more appropriate DLOM model; and (iii) liquidate the Debtors' holdings, not only certain customers' holdings.

1. The DLOM Model Used by Mr. Konstantinidis Performs Poorly Over Long Time Horizons for Volatile Assets Such as the At-Issue Tokens

70. I showed above that when realistic inputs are used in Mr. Konstantinidis' methodology, his approach implies that liquidating the at-issue tokens would take hundreds of years. Since Mr. Konstantinidis' methodology relies on estimating discounts using a DLOM model

based on duration of the liquidation schedule, it is important to use a DLOM model that produces sensible DLOM values at long time horizons.

71. The DLOM model used by Mr. Konstantinidis performs poorly at long time horizons. To be more specific, Mr. Konstantinidis averages DLOM values from two models, the Chaffe and Finnerty models, both of which perform poorly at long time horizons due to mathematical quirks of the two models.¹³¹ As I show in Figure 12, the DLOMs produced by the Finnerty model arbitrarily cannot go above approximately 32 percent, no matter the length of the non-marketability period or the characteristics of the asset at hand.¹³² Perhaps even more problematically, at long time horizons the Chaffe model implies that DLOMs decrease as the length of the non-marketability period increases, a clearly nonsensical result.¹³³ Once combined into an average by Mr. Konstantinidis, these DLOM models result in DLOMs that *decrease* in the non-marketability period beyond an approximately five year horizon. Therefore, Mr. Konstantinidis' model in effect implies that assets that cannot be sold for 30 years are more valuable than assets that are only not marketable for 5 years. As I show in Exhibit 9, Mr. Konstantinidis' model leads to the bizarre conclusion that longer periods of non-marketability for the illiquid at-issue tokens are associated with lower DLOMs. For example, while Mr. Konstantinidis proposes a 45 percent discount for the Maps Vault's MAPS claims based on the

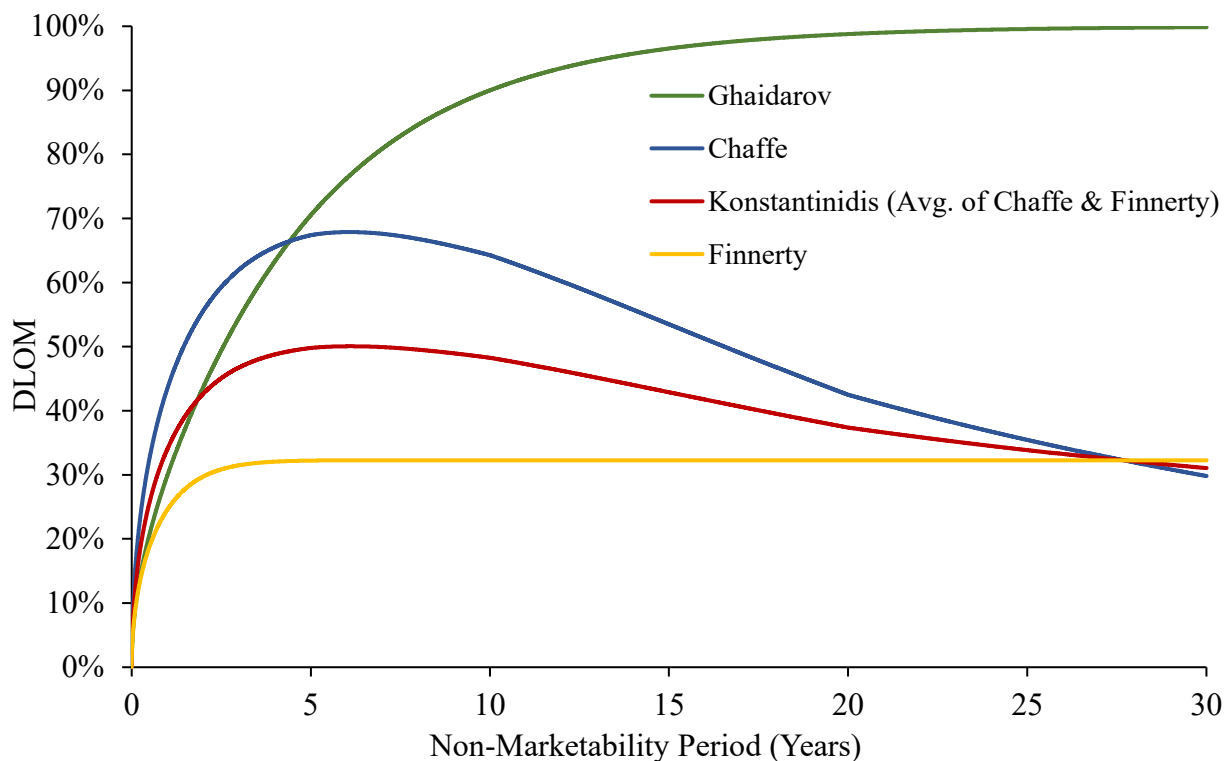
¹³¹ As I explained in the Howell Report, I use Monte Carlo simulations based on the modeling setup of Finnerty (2012) to avoid these pitfalls.

¹³² Mr. Konstantinidis himself appears to have reservations about applying the Finnerty model to highly volatile assets such as the at-issue tokens. For example, in tab "QM (MAPS MV)" of "MAPS 0000479.XLSX," Mr. Konstantinidis' notes that "FINNERTY NOTES HIS MODEL TENDS TO UNDERSTATE DLOM WHEN [volatility] IS < 45% or > 75%." The annualized return volatilities (based on the estimation period used in the Howell Report) of MAPS, OXY, and SRM were 142%, 133%, and 104%, respectively.

¹³³ Mr. Konstantinidis himself appears to have reservations about applying the Chaffe model. For example, in tab "QM (MAPS MV)" of "MAPS 0000479.XLSX," Mr. Konstantinidis notes that "CHAFFE NOTES HIS MODEL TENDS TO UNDERSTATE DLOM."

assumption that those claims could be liquidated within approximately five years, his model implies only a 17 percent discount in a scenario where lack of liquidity in the market for MAPS would only allow the claims to be liquidated over 211 years.

Figure 12
Comparison of DLOM Models Over 30-Year Time Horizon
(For an Asset with 125 Percent Annualized Volatility)



Notes and Sources:

- [1] Ghaidarov, Stillian, “Analysis and Critique of the Average Strike Put Option Marketability Discount Model,” *Working Paper*, 2009, pp. 1-15.
- [2] Chaffee, David B. H. III, “Option Pricing as a Proxy for Discount for Lack of Marketability in Private Company Valuations,” *Business Valuation Review*, December 1993, pp. 182-188.
- [3] Finnerty, John D., “An Average-Strike Put Option Model of the Marketability Discount,” *Journal of Derivatives*, Vol. 19, No. 4, 2012, pp. 53-69. The Finnerty Model asymptotes at 32.3%.
- [4] The results shown in this Figure assume annualized return volatility of 125%. The annualized return volatilities (based on the estimation period used in the Howell Report) of MAPS, OXY, and SRM were 142%, 133%, and 104%, respectively. I show the DLOM curves for each of the at-issue tokens in Exhibit 10.

72. However, not all DLOM models exhibit the undesirable characteristic of resulting in DLOMs that decrease as the length of the non-marketability period increases. As I show in

Figure 12, the Ghaidarov model behaves as expected at multi-decade time horizons, while providing similar DLOM values as the average of the Chaffe and Finnerty models at short horizons.¹³⁴ Therefore, I rely on the Ghaidarov model to calculate the discounts implied by Mr. Konstantinidis' methodology when using corrected inputs for trading volume.

2. *Discounts According to Mr. Konstantinidis' Methodology Based on Corrected Inputs*

73. In Figure 13, I show the discounts produced by Mr. Konstantinidis' methodology when using corrected inputs for trading volume and the Ghaidarov DLOM model.¹³⁵ Consistent with the Howell Report, the liquidation of the Debtors' MAPS and OXY holdings are associated with 100 percent discounts. The liquidation of the Debtors' SRM holdings is associated with a 76 percent discount, which exceeds the 58 percent ALD estimated in the Howell Report¹³⁶ and is broadly consistent with the combined ALD and DLOM estimated for locked SRM claims in the Howell Report.¹³⁷

¹³⁴ The simulation approach I pursued in the Howell Report is computationally infeasible for the extreme time horizons contemplated here.

¹³⁵ I show further detail and additional liquidation scenarios in Exhibit 9.

¹³⁶ Howell Report, Exhibit 3.

¹³⁷ Howell Report, Exhibit 4A.

Figure 13
DLOMs Implied by Mr. Konstantinidis' Methodology
With Corrected Trading Volume Inputs

		Time to Liquidate	
	Liquidating Entity	(Years)	Discount
MAPS	Maps Vault, Ltd.	210.6	100%
	Fondation Serendipity	107.4	100%
	Plaintiffs Combined	318.0	100%
	Debtor	541.1	100%
OXY	Oxygen Vault, Ltd.	49.2	98%
	Fondation Serendipity	15.8	73%
	Fondation Elements	31.6	92%
	Plaintiffs Combined	96.7	100%
	Debtor	158.0	100%
SRM	Oxygen Vault, Ltd.	4.8	51%
	Maps Vault, Ltd.	4.8	51%
	Plaintiffs Combined	4.8	51%
	Debtor	10.8	76%

Notes and Sources:

[1] Exhibit 9.


[2] Ghaidarov, Stillian, "Analysis and Critique of the Average Strike Put Option Marketability Discount Model," *Working Paper*, 2009, p. 20.

[3] I calculate discounts as the DLOM implied by the Ghaidarov model using pre-Petition Date historical average trading volumes from the Howell Report throughout the liquidation period. I otherwise apply Mr. Konstantinidis' methodology unchanged.

74. It is worth noting that the discounts presented in Figure 13 and Exhibit 9 reflect *only* the DLOM associated with the asset liquidation strategy proposed by Mr. Konstantinidis, but *do not* reflect the ALD associated with such a strategy. As I discussed in Section VII.C, a strategy of liquidating 10 percent of daily volume *every day for years* would likely have a non-trivial negative impact on prevailing market prices. Therefore, the discounts in Figure 13 and Exhibit 9 are underestimates. As I discussed in Section VII.C, in a single year after liquidation commenced, the price impact of liquidation would plausibly result in additional discounts of up to 100 percent for MAPS, 100 percent for OXY, and 99 percent for SRM.

75. In sum, when correctly applied, Mr. Konstantinidis' methodology would be consistent with a conclusion that the value of Debtors' holdings of the at-issue tokens was negligible as of the Petition Date.

Dated: February 9, 2024



Sabrina T. Howell

Appendix A**Additional Materials Considered****Legal Documents**

Declaration of Kevin Lu in Support of Motion of Debtors to Estimate Claims Based on Digital Assets, December 27, 2023.

Expert Report of Fotios Konstantinidis on behalf of Fondation Elements, Liquidity Network Ltd, Fondation Serendipity and Serendipity Network Ltd. and produced documents, January 26, 2024.

Expert Report of Fotios Konstantinidis on behalf of Maps Vault Ltd. and Oxygen Vault Ltd. and produced documents, January 26, 2024.

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Data

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Appendix B

Alternative Models for Estimating ALDs

1. This appendix provides the detailed formulas of the alternative models I use to estimate the asset liquidation discounts (“ALDs”) in the Howell Rebuttal Report Figure 5. Alternative models are (i) the linear version of the Kyle and Obizhaeva (2016) model,¹ (ii) the Amihud (2002) price impact model,² (iii) the practitioner-oriented square-root model of price impact,³ and (iv) four additional models (Conv-N, Conv-V, Almgren-Chriss,⁴ and Frazzini-Israel-Moskowitz⁵) used by Kyle and Obizhaeva (2023)⁶ in their robustness tests. The KO (2016) measure estimates the average price impact whereas the rest of the models mentioned above estimate the total price impact. Thus, I divide the estimates from models estimating the total price impact by a factor of 2 to be consistent with KO (2023).⁷

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⁴ Almgren, Robert et al., “Direct Estimation of Equity Market Impact,” *Risk*, Vol. 18, No. 7, 2005, pp. 58-62 (“Almgren et al. (2005)”).

⁵ Frazzini, Andrea, Ronen Israel, and Tobias J. Moskowitz, “Trading Costs,” *Working Paper*, 2018, pp. 1-47 (“Frazzini et al. (2018)”).

⁶ Kyle, Albert S. and Anna A. Obizhaeva, “Large Bets and Stock Market Crashes,” *Review of Finance*, Vol. 27, No. 6, 2023, pp. 2163-2203 (“KO (2023)”).

⁷ See KO (2023) footnote 4 at p. 2175.

B-I. KO LINEAR MODEL

The linear specification of the KO (2016) model is:⁸

$$\text{Linear KO ALD} = \frac{\sigma}{0.02} \left(\frac{8.02}{10^4} \cdot \left[\frac{\sigma \cdot V \cdot P}{(0.02)(40)(10^6)} \right]^{-\frac{1}{3}} + \frac{2.19}{10^4} \cdot \left[\frac{\sigma \cdot V \cdot P}{(0.02)(40)(10^6)} \right]^{\frac{1}{3}} \left[\frac{X}{0.01V} \right] \right)$$

where σ is standard deviation of daily returns in the estimation period; P is the price as of the Petition Date; X is the quantity of the Debtors' holdings; V is the average daily trading volume (in quantity).

B-II. AMIHUD (2002)

The Amihud measure is:⁹

$$\text{Amihud} = \frac{1}{2T} \sum_t \frac{|r_t|}{\$V_t}$$

where $|r_t|$ is the absolute value of daily return on day t ; $\$V_t$ is the dollar trading volume on day t ; T is the total number of days in the estimation period. This measure represents the price drop when \$1 of volume is liquidated. Thus, the ALD for a trading volume of $\$X$ is:

$$\text{Amihud ALD} = \frac{1}{2T} \sum_t \frac{|r_t|}{\$V_t} \cdot \$X$$

where $\$X$ is the dollar value of the Debtors' holdings.

⁸ See Equation (27) and Table V in KO (2016). For κ_0 and κ_1 , the average of the NYSE and NASDAQ "Sell" estimates from the KO model calibration results are employed. Therefore, $\kappa_0 \times 10^4 = \frac{6.77+9.27}{2} = 8.02$ and $\kappa_1 \times 10^4 = \frac{1.92+2.46}{2} = 2.19$ are employed.

⁹ See Amihud (2002), Equation (1). The estimates are divided by a factor of 2 to convert price impact estimates to average price impact estimates.

B-III. SQUARE-ROOT MODEL

The square-root model of price impact takes the simple form of:¹⁰

$$\text{Square-Root ALD} = \frac{\sigma}{2} \sqrt{\frac{X}{V}}$$

where σ is standard deviation of daily returns in the estimation period; X is the quantity of Debtors' holdings; V is the average daily trading volume (in quantity).

B-IV. CONV-N

The Conv-N model is the conventional model based on market capitalization:¹¹

$$\text{Conv-N ALD} = \frac{X}{2N}$$

where X is the quantity of the Debtors' holdings; N is the circulating supply as of the Petition Date (in quantity).

B-V. CONV-V

The Conv-V model is the conventional model based on daily volume:¹²

¹⁰ See Grinold and Kahn (1995), Chapter 16. The estimates are divided by a factor of 2 to convert price impact estimates to average price impact estimates. See also, KO (2023), Appendix B Equation (20).

¹¹ See KO (2023), Appendix B Equation (18). For digital assets, I use their circulating supply as their market capitalization. The estimates are divided by a factor of 2 to convert price impact estimates to average price impact estimates.

¹² See KO (2023), Appendix B Equation (19). The estimates are divided by a factor of 2 to convert price impact estimates to average price impact estimates. I first multiply the daily trading volume by 365 (instead of 250 as in KO (2023)) because the digital asset market is operated 365 days per year. I then divide the annual trading volume by the annual turnover of the digital asset market. The annual turnover of the digital asset market is approximated by the average of the annual turnover of BTC, ETH, MAPS, OXY, and SRM. The annual turnover for each digital asset is calculated as 365 times the daily turnover, defined as the average daily trading volume in the estimation period divided by the circulating supply as of the Petition Date.

$$\text{Conv-V ALD} = \frac{X}{2 \cdot \frac{365V}{c}}$$

where X is the quantity of the Debtors' holdings; V is the average daily trading volume (in quantity); c is the annual turnover of the digital asset market.

B-VI. ALMGREN-CHRISS

The Almgren-Chriss model is from Almgren et al. (2005),¹³ discussed in KO (2023) for robustness tests:¹⁴

$$\text{Almgren-Chriss ALD} = \frac{1}{2} \left(0.314 \cdot \sigma \cdot \frac{X}{V} \cdot \left(\frac{N}{V} \right)^{\frac{1}{4}} + 2 \cdot 0.142 \cdot \sigma \cdot \left(\frac{X}{V \cdot T} \right)^{\frac{3}{5}} \right)$$

where σ is standard deviation of daily returns in the estimation period; X is the quantity of the Debtors' holdings; V is the average daily trading volume (in quantity); N is the circulating supply as of the Petition Date (in quantity); T is the time horizon over which X is executed.¹⁵

B-VII. FRAZZINI-ISRAEL-MOSKOWITZ

The Frazzini-Israel-Moskowitz ("FIM") model is from Frazzini et al. (2018),¹⁶ discussed in KO (2023) for robustness tests:¹⁷

¹³ Almgren et al. (2005).

¹⁴ See KO (2023), Appendix B Equation (21). The estimates are divided by a factor of 2 to convert price impact estimates to average price impact estimates.

¹⁵ Following Mr. Konstantinidis' assumptions, I assume that the position is liquidated by selling 10% of daily trading volume per day. Thus, the time it takes to execute the liquidation is $T = \frac{X}{0.1V}$.

¹⁶ Frazzini et al. (2018).

¹⁷ See KO (2023), Appendix B Equation (22). The estimates are divided by a factor of 2 to convert price impact estimates to average price impact estimates. I use the square root of 365 (instead of the square root of 252 as in

$$FIM\ ALD = \frac{1}{2} \cdot \frac{2}{10^4} \left(-0.2 \cdot \ln(1 + N \cdot 10^{-9}) + 0.35 \cdot \frac{X}{0.01V} + 9.32 \cdot \left(\frac{X}{0.01V} \right)^{\frac{1}{2}} + 0.13 \cdot \sigma \cdot \sqrt{365} \cdot 100 \right)$$

where σ is standard deviation of daily returns in the estimation period; X is the quantity of the Debtors' holdings; V is the average daily trading volume (in quantity); N is the circulating supply as of the Petition Date (in quantity).

Frazzini et al. (2018) and KO (2023)) times the returns volatility because the digital asset market is operated 365 days per year.

Exhibit 1

SRM Delisting From Exchanges

	Exchange	Delisting Month
[1]	Binance	November 2022 - August 2023
[2]	Binance.US	December 2022
[3]	Bitfinex	December 2022
[4]	CEX.io	May 2023
[5]	KuCoin	October 2023
[6]	OKX	April 2023 - October 2023
[7]	Upbit	April 2023

Notes and Sources:

- [1] “Crypto Exchange Binance Delists Serum Trading Pairs Amid FTX Connection,” *Binance Square*, November 25, 2022, available at <https://www.binance.com/en/feed/post/90475> (“Cryptocurrency exchange Binance will delist three Serum (SRM) trading pairs as the fallout from FTX’s collapse continues, according to an announcement on Friday. The exchange will terminate trading of the SRM/BNB, SRM/BTC and SRM/USDT trading pairs on Nov. 28 ... The majority of SRM trading volume takes place on Binance, according to CoinMarketCap, although the token is still listed on Kraken, Kucoin and Gate.io.”).
 “Binance Will Delist SNM, SRM and YFII on 2023-08-22,” *Binance*, August 15, 2023, available at <https://www.binance.com/en/support/announcement/binance-will-delist-snm-srm-and-yfii-on-2023-08-22-f43511a4c1d347a8a2dd1efbdd2fe716> (“Based on our most recent reviews, we have decided to delist and cease trading on all trading pairs for the following tokens at 2023-08-22 03:00 (UTC): ... Serum (SRM)”).
- [2] “Binance.US Will Delist Serum (SRM) on December 20, 2022,” *Binance.US*, available at <https://support.binance.us/hc/en-us/articles/10830815940631-Binance-US-Will-Delist-Serum-SRM-on-December-20-2022> (“Based on our most recent review, Serum (SRM) will be delisted from Binance.US on December 20, 2022. Please note: SRM deposits on Binance.US will be closed on December 20, 2022 at 9 p.m. EST. Any deposits of SRM after this time will not be credited to your account. Withdrawals will remain open. SRM/USD and SRM/USDT trading pairs will be removed on December 20, 2022 at 10 p.m. EST.”).
- [3] “Bitfinex Delists 6 Tokens,” *Bitfinex*, December 20, 2022, available at <https://www.bitfinex.com/posts/876> (“In line with our commitment to delivering the best trading experience, we are delisting Celsius Network (CEL), Serum (SRM) ...”).
- [4] “Delisting notice,” *CEX.io*, available at <https://support.cex.io/en/articles/7229240-delisting-notice> (“Due to low or no trading activity, we’ve decided to delist 31 cryptocurrencies [including SRM] ... On May 4, 2023, these 31 assets will be delisted from CEX.IO. Withdrawals will remain operational.”).
- [5] “ST: KuCoin Will Delist Certain Projects,” *KuCoin*, October 24, 2023, available at <https://www.kucoin.com/announcement/en-st-kucoin-will-delist-certain-projects-20231024> (“According to the Special Treatment Rules of KuCoin, the following projects have been disqualified, and the tokens will be removed from the platform [list includes SRM] ... The above mentioned trading pairs will be delisted at 06:00:00 on October 26, 2023 (UTC).”).

Exhibit 1

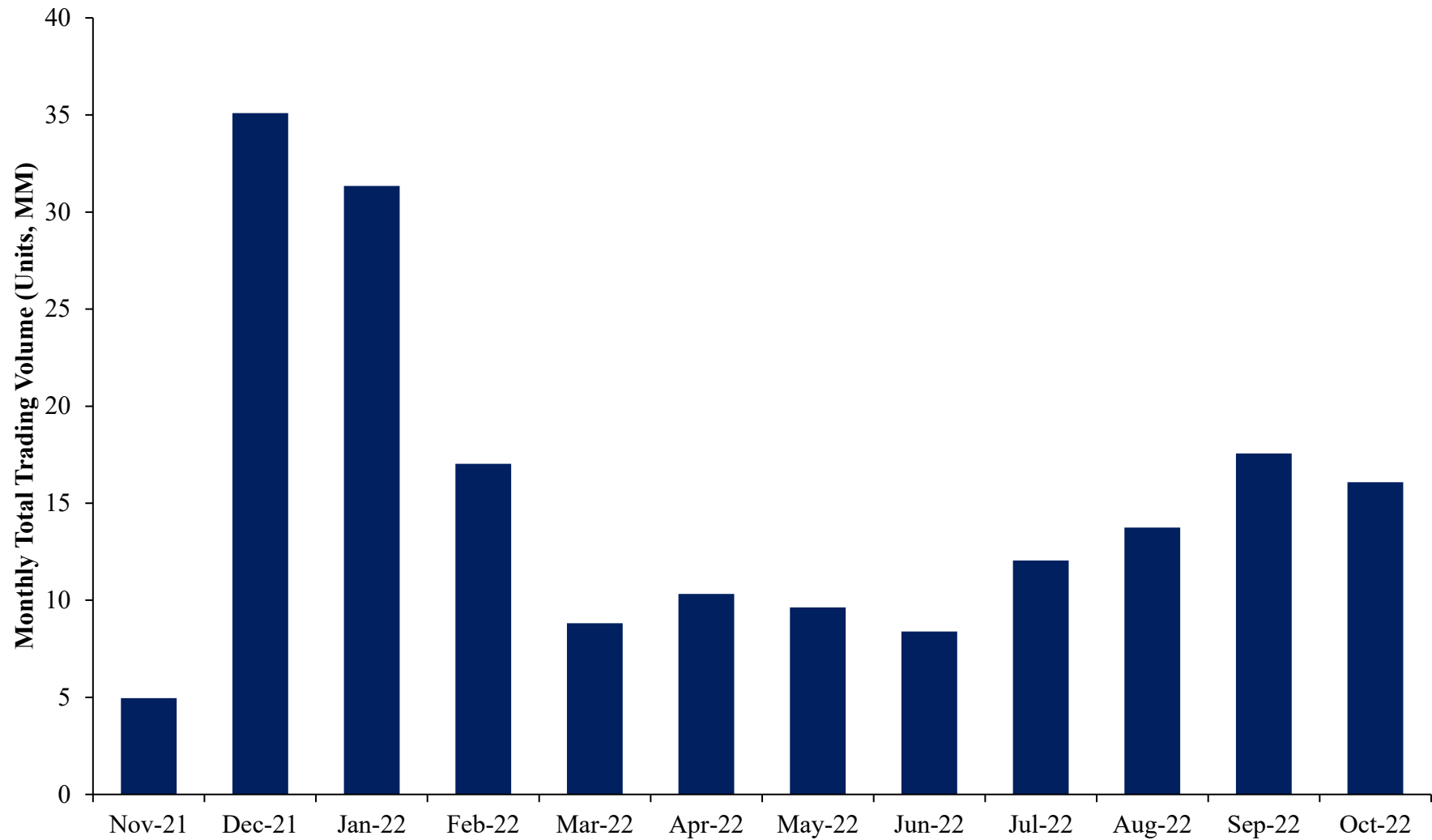
SRM Delisting From Exchanges

Notes and Sources (Cont.):

[6] “OKX to delist several spot trading pairs,” *OKX*, April 6, 2023, available at <https://www.okx.com/help/okx-to-delist-several-spot-trading-pairs> (“[W]e will be delisting several projects that do not fulfill our listing criteria [list includes SRM/BTC, set to be delisted on April 11, 2023]”). “OKX to delist KOL, GM, SRM, UMEE, VALUE, MITH, JFI, and SOS spot trading pairs,” *OKX*, October 9, 2023, available at <https://www.okx.com/help/okx-to-delist-kol-gm-srm-umee-value-mith-jfi-and-sos-spot-trading-pairs> (“We will delist the above-mentioned trading pair [including SRM/USDT and SRM/USDC] at 8:00 - 8:30 am UTC on October 16, 2023.”).

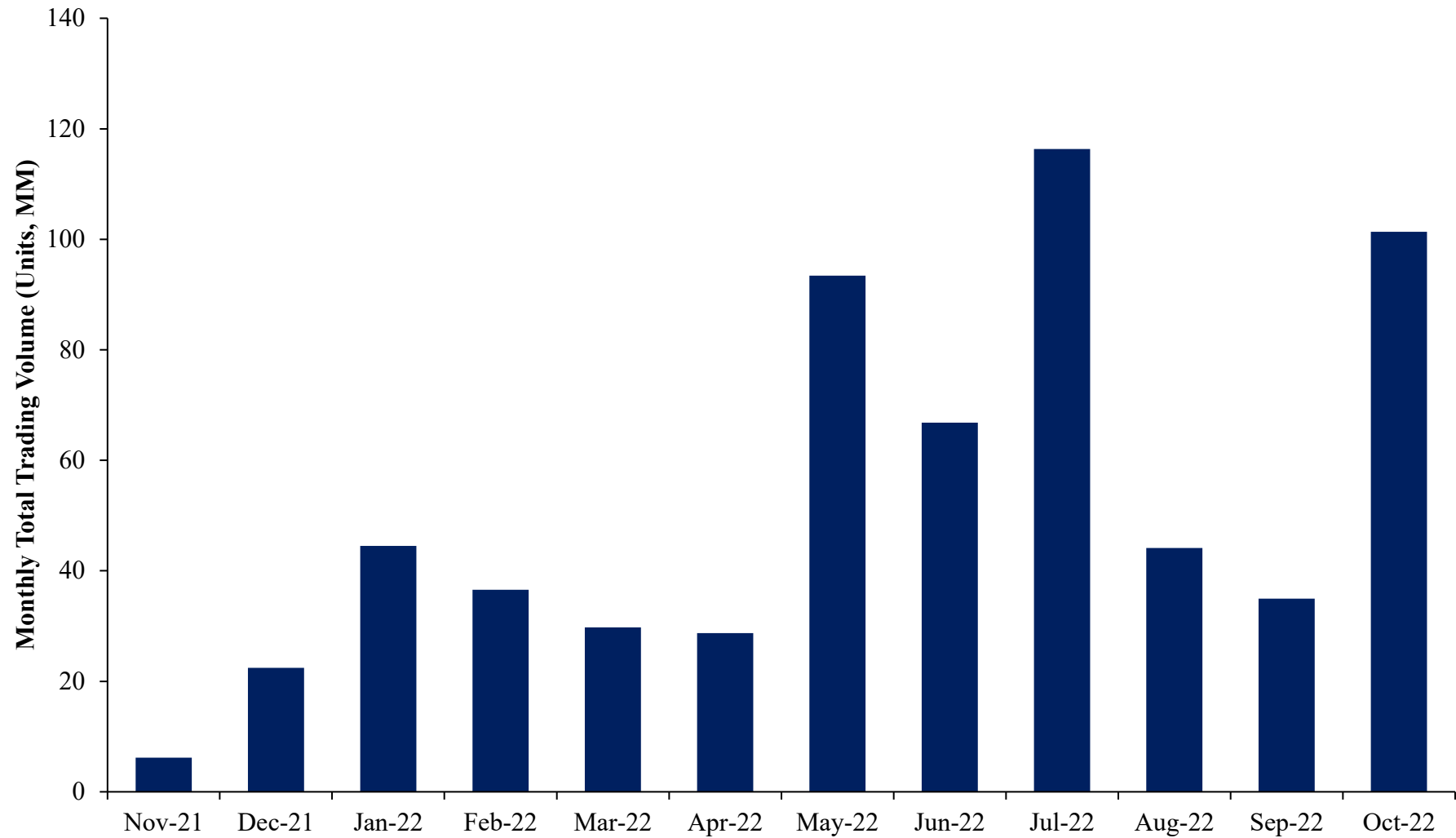
[7] “APE Trading at Premium on Upbit,” *Medium*, April 13, 2023, available at <https://medium.com/@coinness.gl/ape-trading-at-premium-on-upbit-c26f7dbel1edf> (“Earlier on Wednesday, Upbit also announced that it will delist OmiseGo (OMG) and Serum (SRM) ... In the case of Serum, Upbit cited operational issues with the project and the current impossibility of using the SRM protocol.”).

Exhibit 2A
MAPS Monthly Total Trading Volume
November 01, 2021 - October 31, 2022



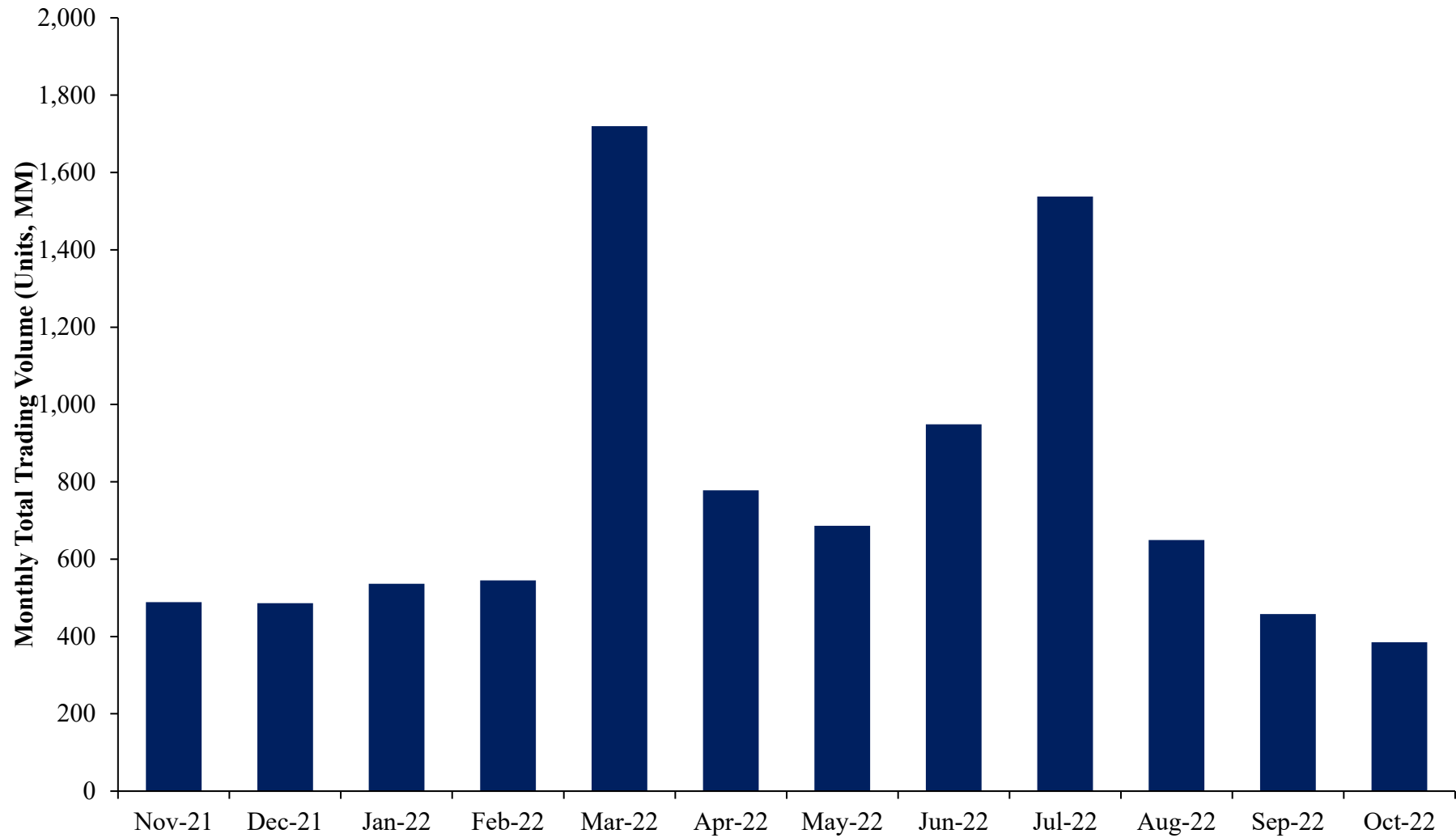
Source: Howell Report.

Exhibit 2B
OXY Monthly Total Trading Volume
November 01, 2021 - October 31, 2022



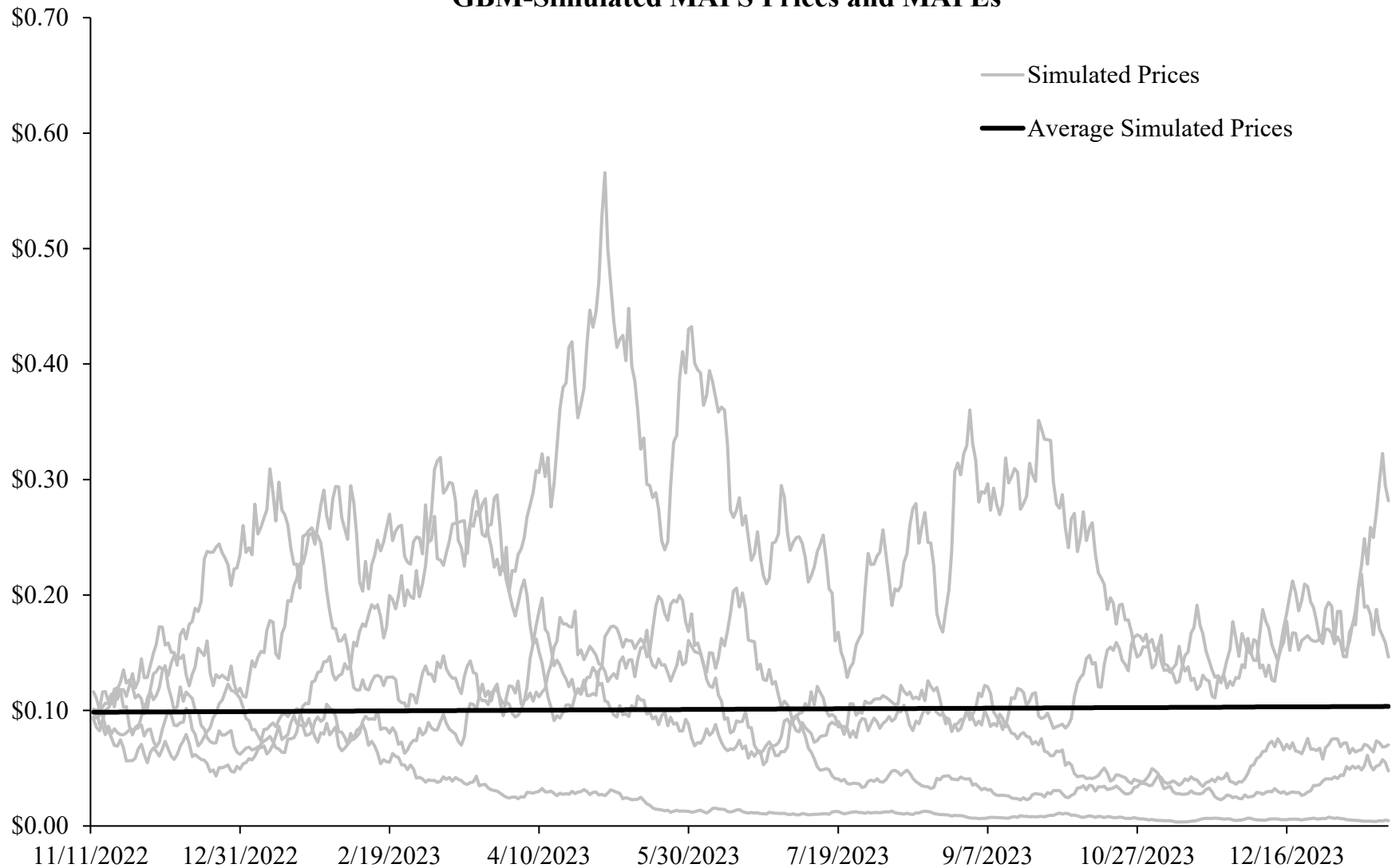
Source: Howell Report.

Exhibit 2C
SRM Monthly Total Trading Volume
November 01, 2021 - October 31, 2022



Source: Howell Report.

Exhibit 3A GBM-Simulated MAPS Prices and MAPEs

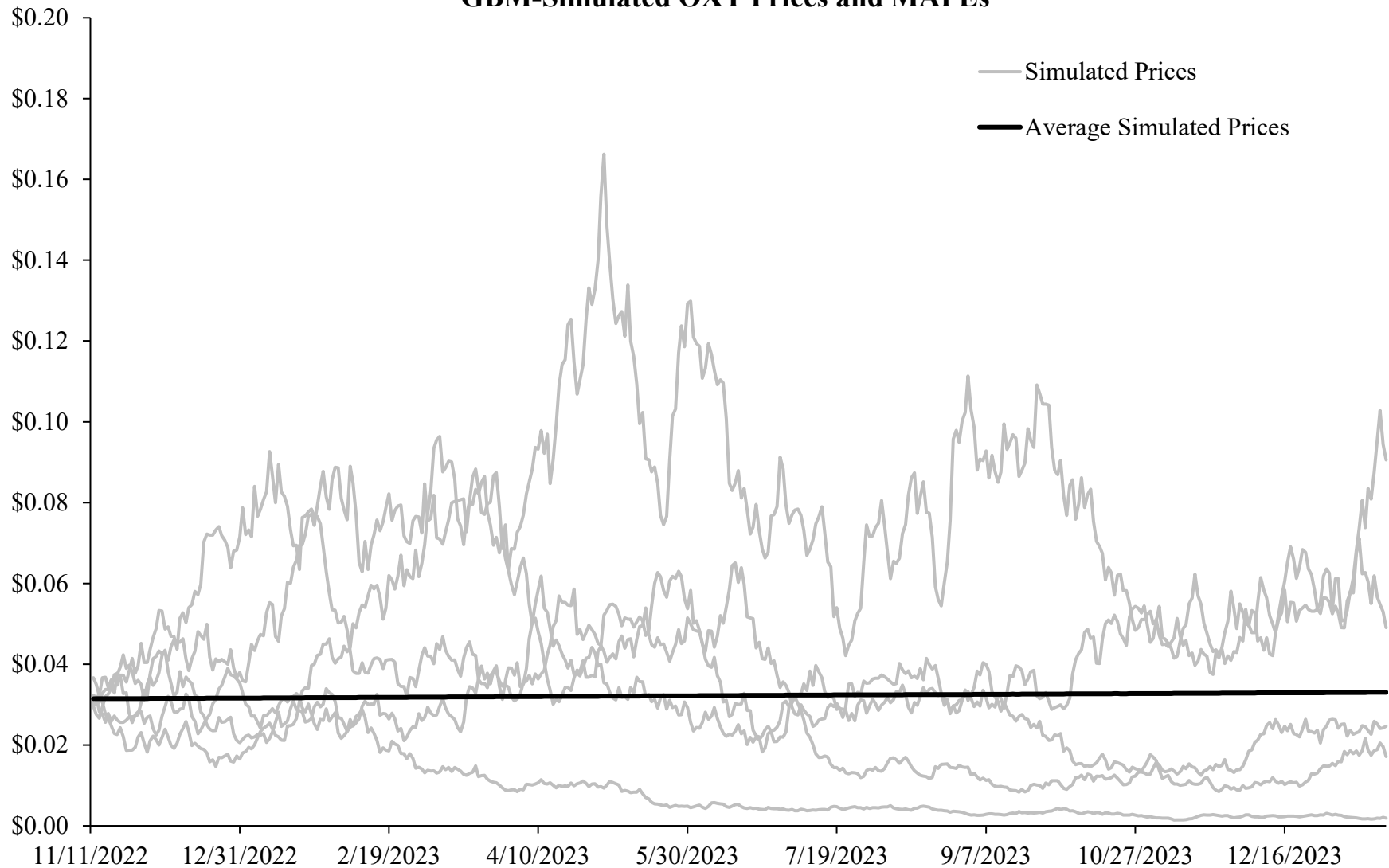


Notes and Sources:

[1] Average Simulated Prices are the daily averages of 2.5 million iterations in the Monte Carlo simulation of MAPS prices used in the Howell Report for DLOM calculation.

[2] Simulated prices represent five series from the Monte Carlo simulation performed according to the methodology in the Howell Report.

Exhibit 3B GBM-Simulated OXY Prices and MAPEs

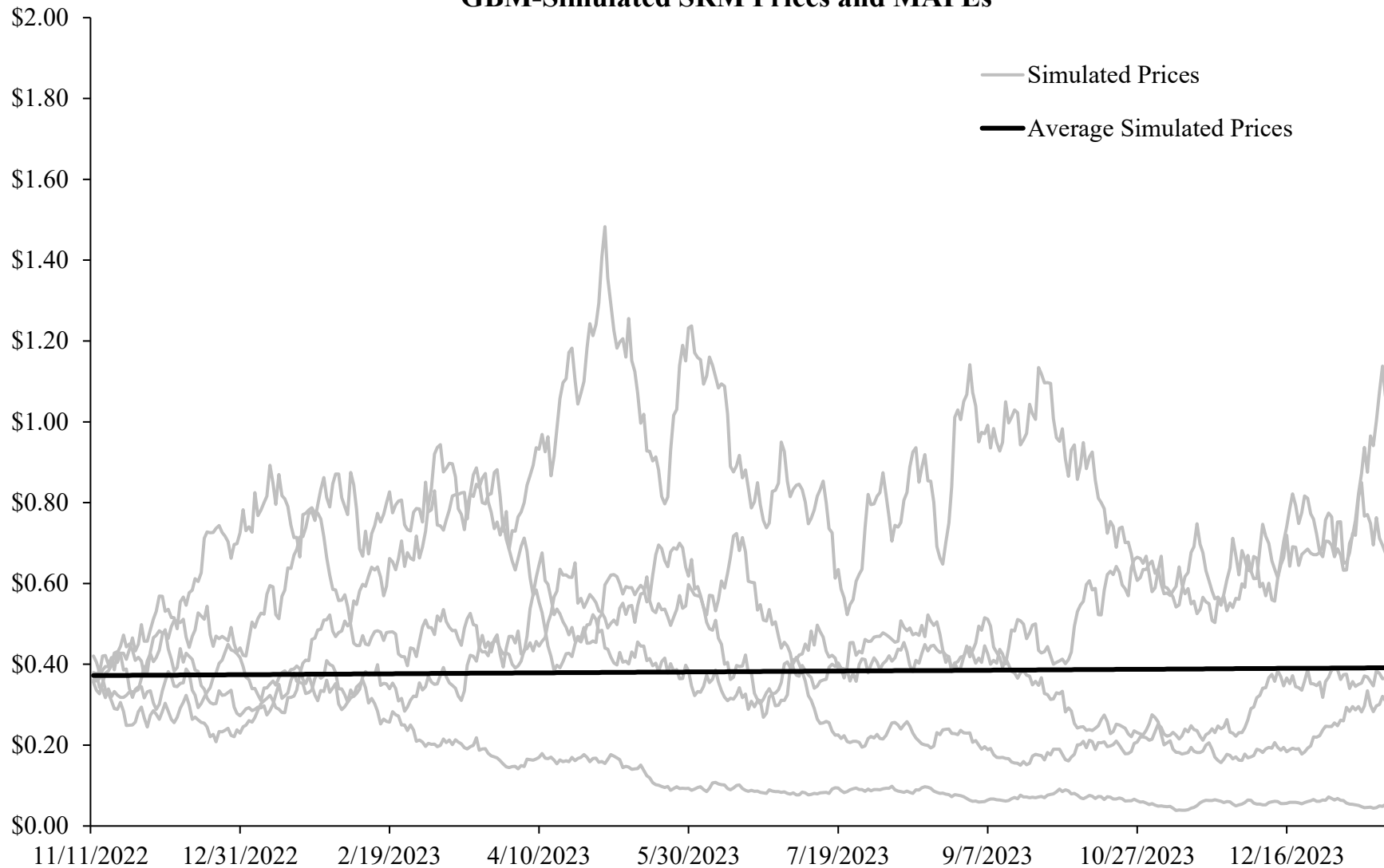


Notes and Sources:

[1] Average Simulated Prices are the daily averages of 2.5 million iterations in the Monte Carlo simulation of OXY prices used in the Howell Report for DLOM calculation.

[2] Simulated prices represent five series from the Monte Carlo simulation performed according to the methodology in the Howell Report.

Exhibit 3C GBM-Simulated SRM Prices and MAPEs

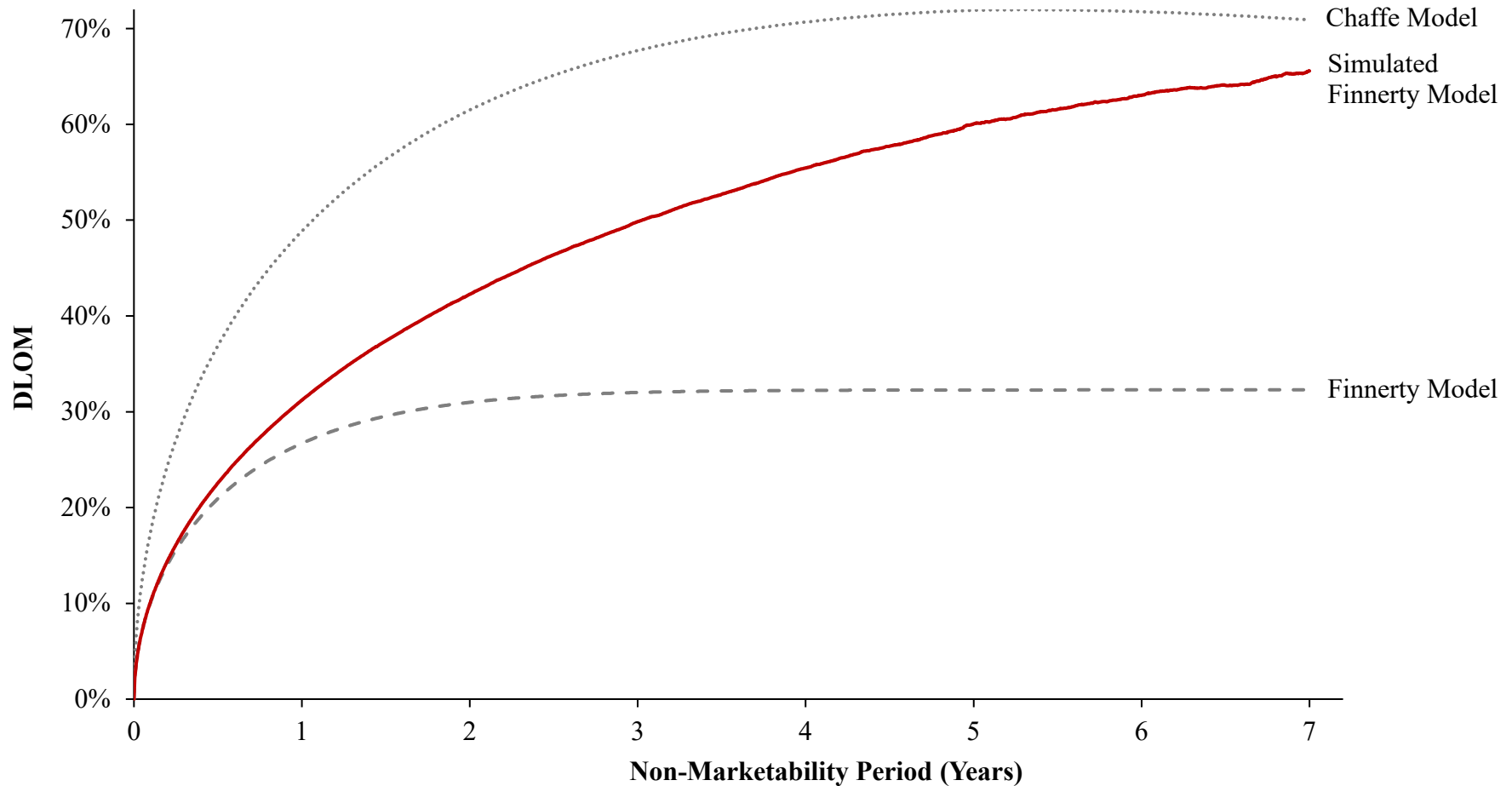


Notes and Sources:

[1] Average Simulated Prices are the daily averages of 2.5 million iterations in the Monte Carlo simulation of SRM prices used in the Howell Report for DLOM calculation.

[2] Simulated prices represent five series from the Monte Carlo simulation performed according to the methodology in the Howell Report.

Exhibit 4A
DL0M Indicated by Different Models — MAPS ($\sigma = 142\%$)



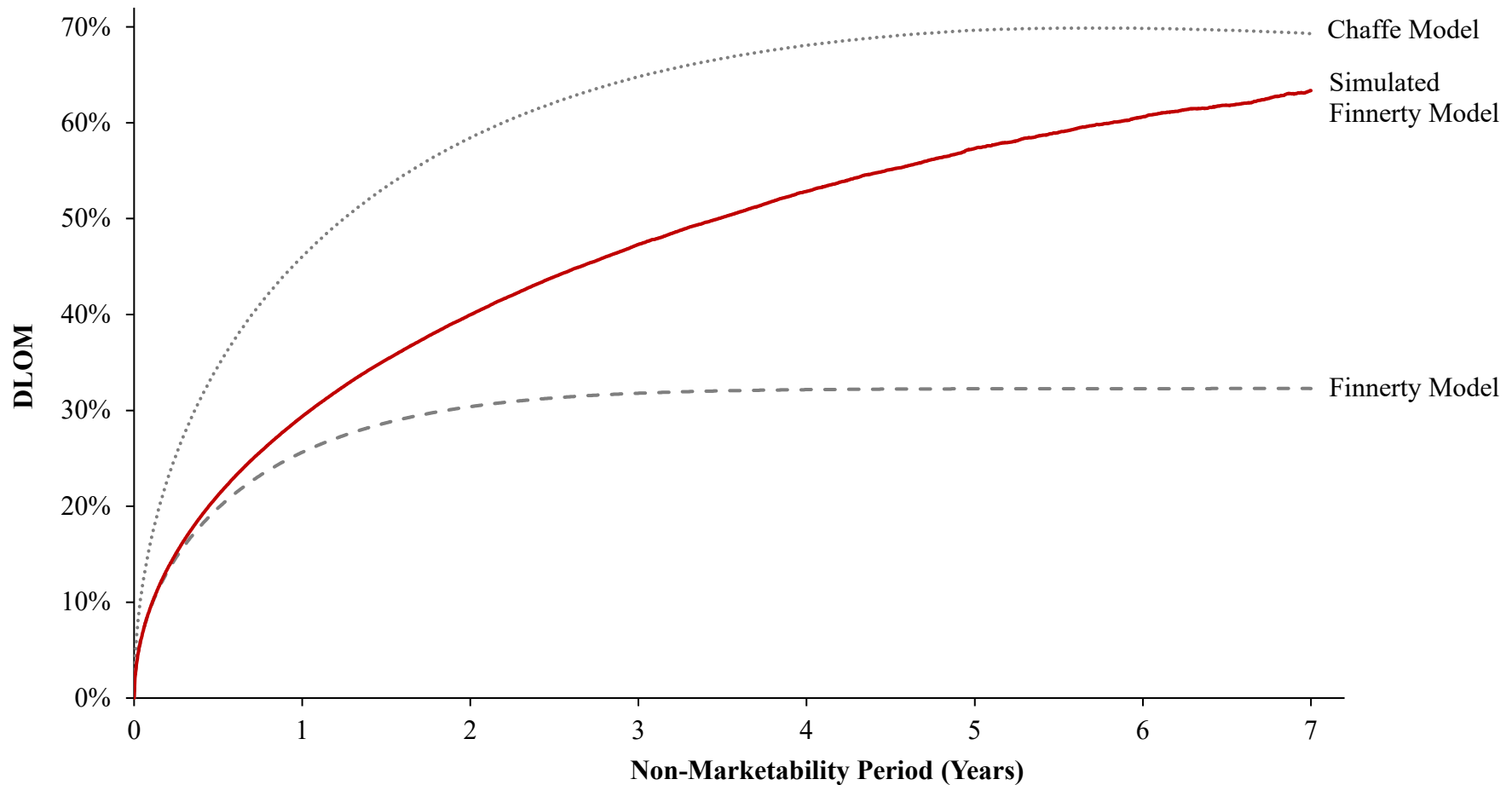
Notes and Sources:

[1] Chaffee, David B. H. III, "Option Pricing as a Proxy for Discount for Lack of Marketability in Private Company Valuations," *Business Valuation Review*, December 1993, pp. 182-188.

[2] Finnerty, John D., "An Average-Strike Put Option Model of the Marketability Discount," *Journal of Derivatives*, Vol. 19, No. 4, 2012, pp. 53-69.

[3] See Howell Report, Appendix C for details on the implementation of the Simulated Finnerty Model.

Exhibit 4B
DLOM Indicated by Different Models — OXY ($\sigma = 133\%$)



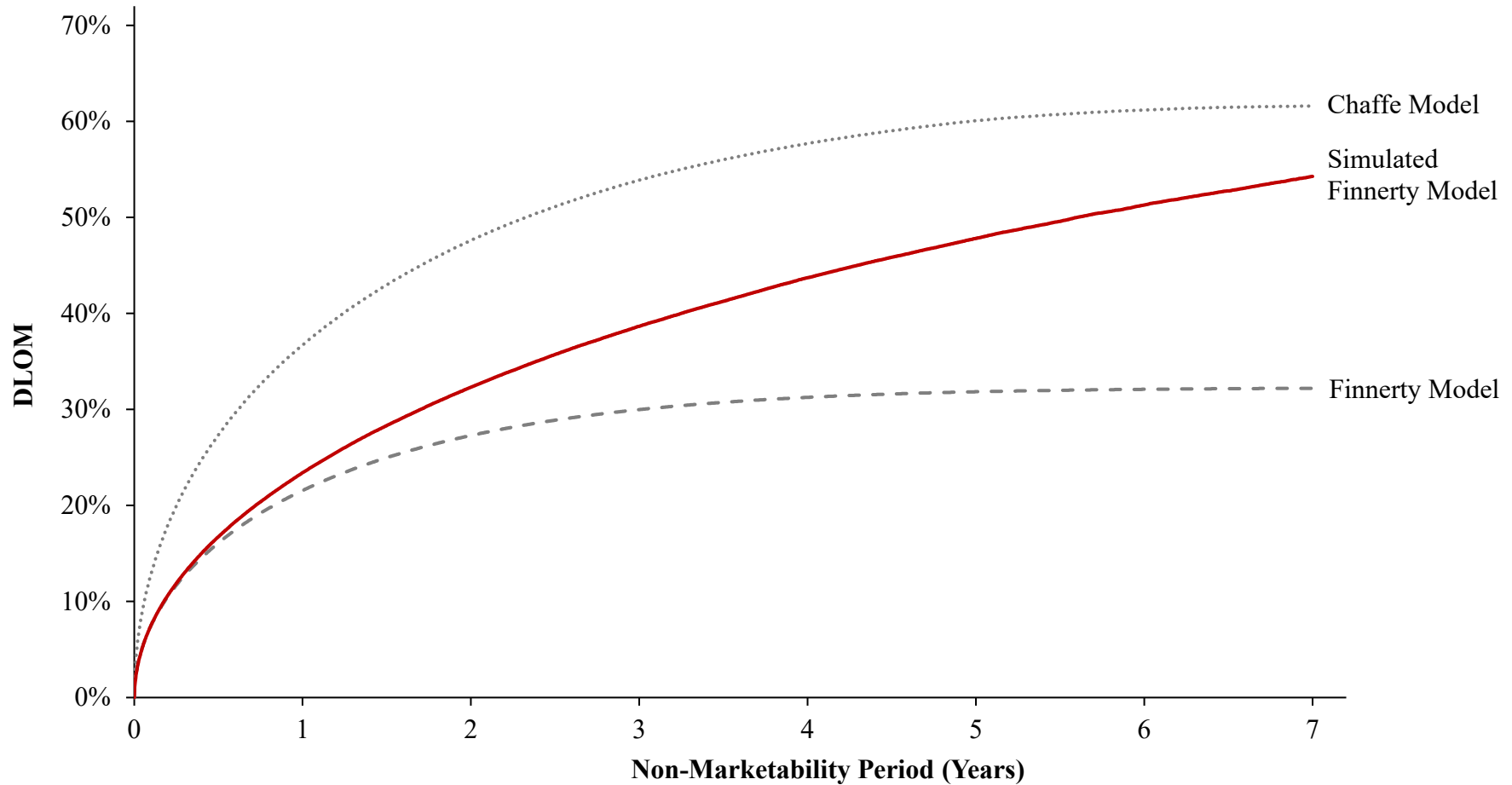
Notes and Sources:

[1] Chaffee, David B. H. III, “Option Pricing as a Proxy for Discount for Lack of Marketability in Private Company Valuations,” *Business Valuation Review*, December 1993, pp. 182-188.

[2] Finnerty, John D., “An Average-Strike Put Option Model of the Marketability Discount,” *Journal of Derivatives*, Vol. 19, No. 4, 2012, pp. 53-69.

[3] See Howell Report, Appendix C for details on the implementation of the Simulated Finnerty Model.

Exhibit 4C
DL0M Indicated by Different Models — SRM ($\sigma = 104\%$)



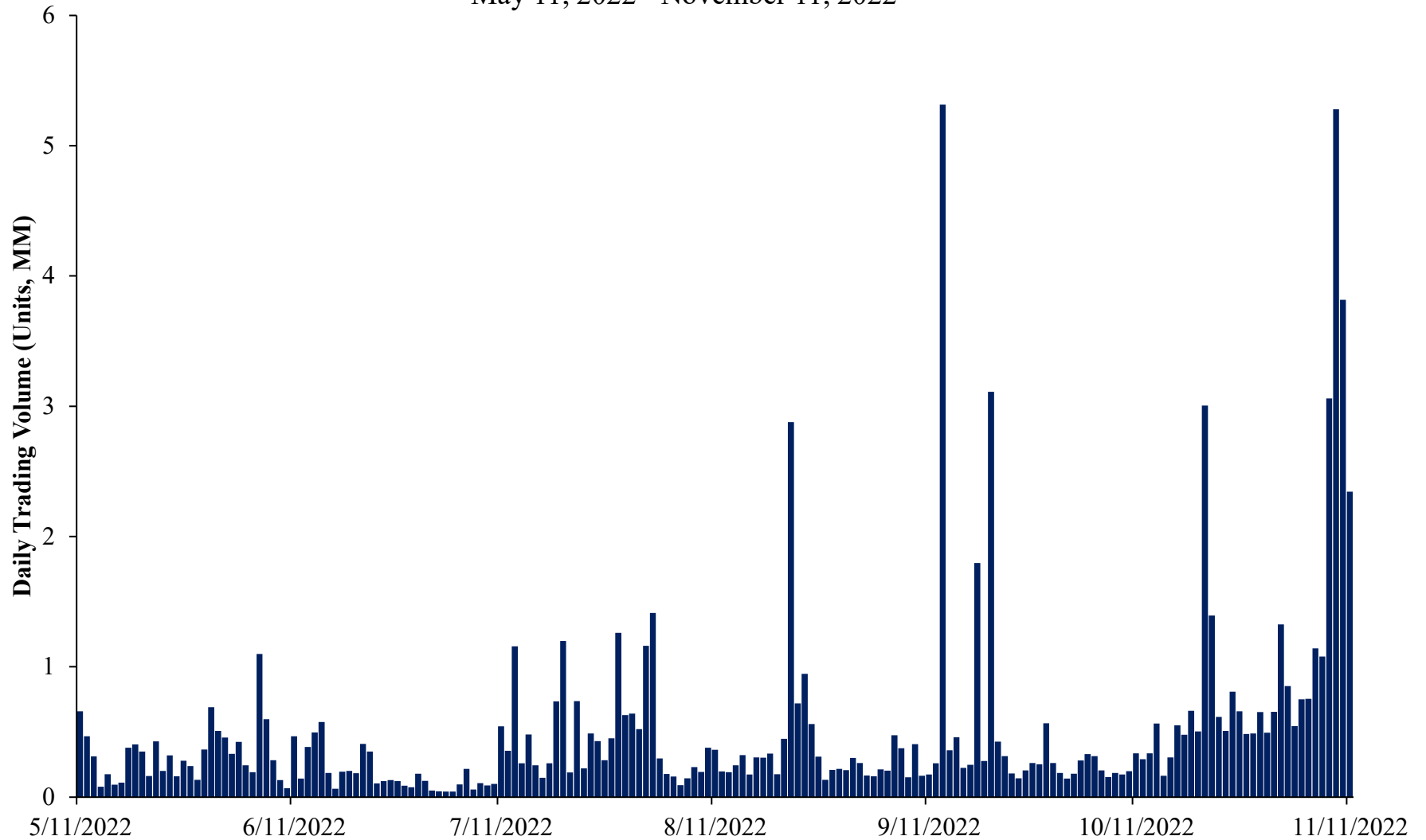
Notes and Sources:

[1] Chaffee, David B. H. III, “Option Pricing as a Proxy for Discount for Lack of Marketability in Private Company Valuations,” *Business Valuation Review*, December 1993, pp. 182-188.

[2] Finnerty, John D., “An Average-Strike Put Option Model of the Marketability Discount,” *Journal of Derivatives*, Vol. 19, No. 4, 2012, pp. 53-69.

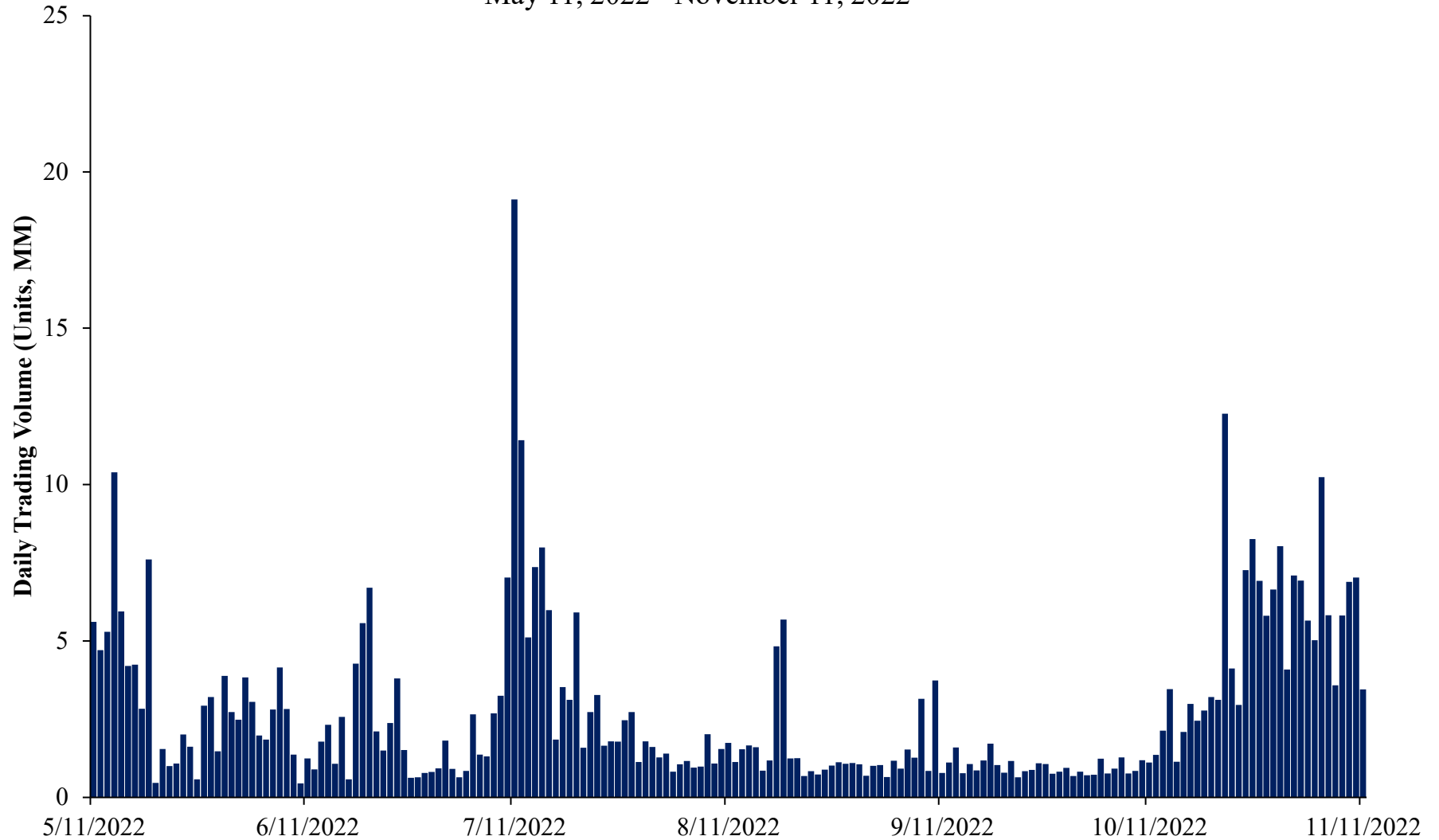
[3] See Howell Report, Appendix C for details on the implementation of the Simulated Finnerty Model.

Exhibit 5A
MAPS Daily Trading Volume: Six Months Leading Up to Petition Date
May 11, 2022 - November 11, 2022



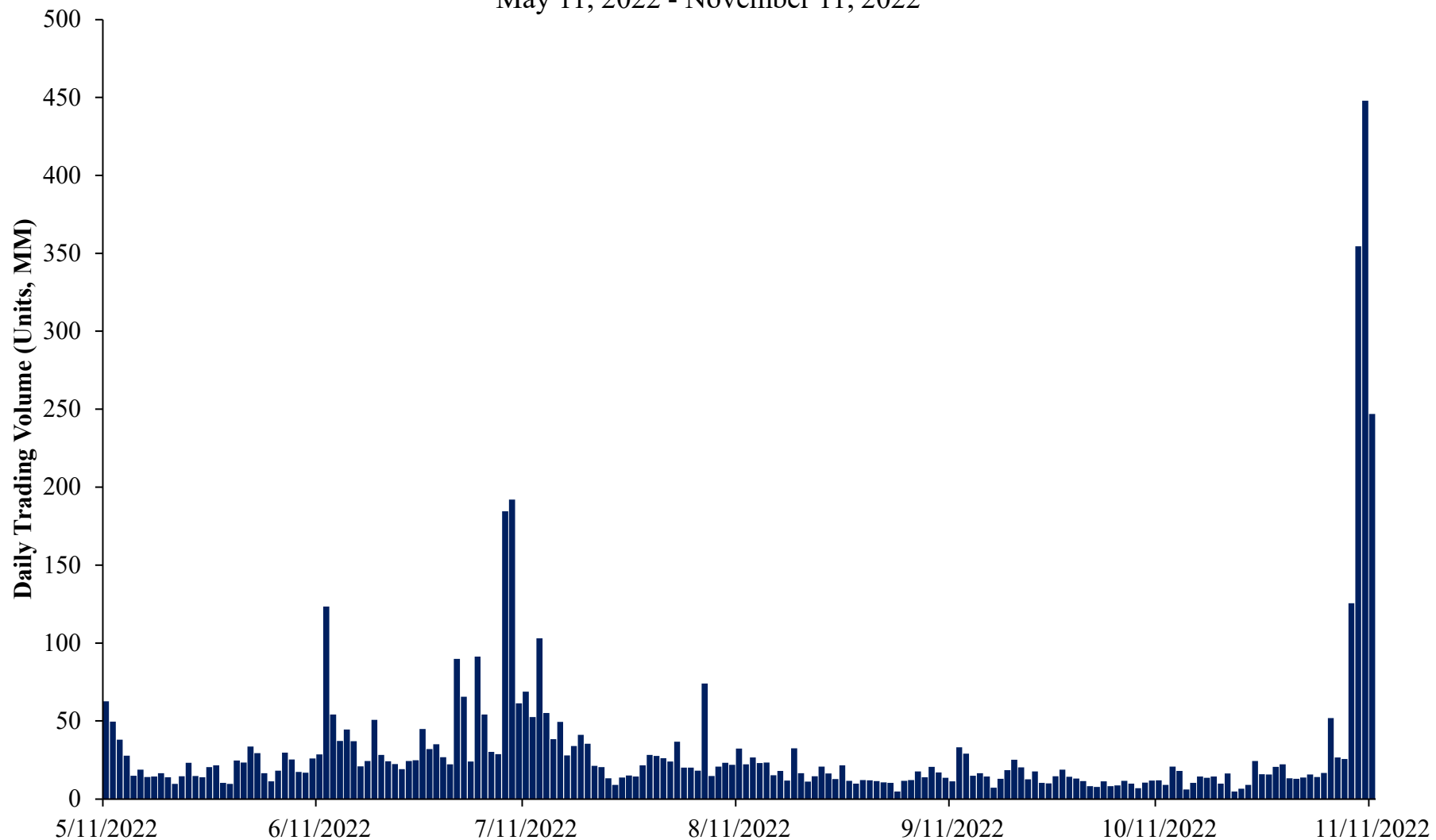
Source: Howell Report.

Exhibit 5B
OXY Daily Trading Volume: Six Months Leading Up to Petition Date
May 11, 2022 - November 11, 2022



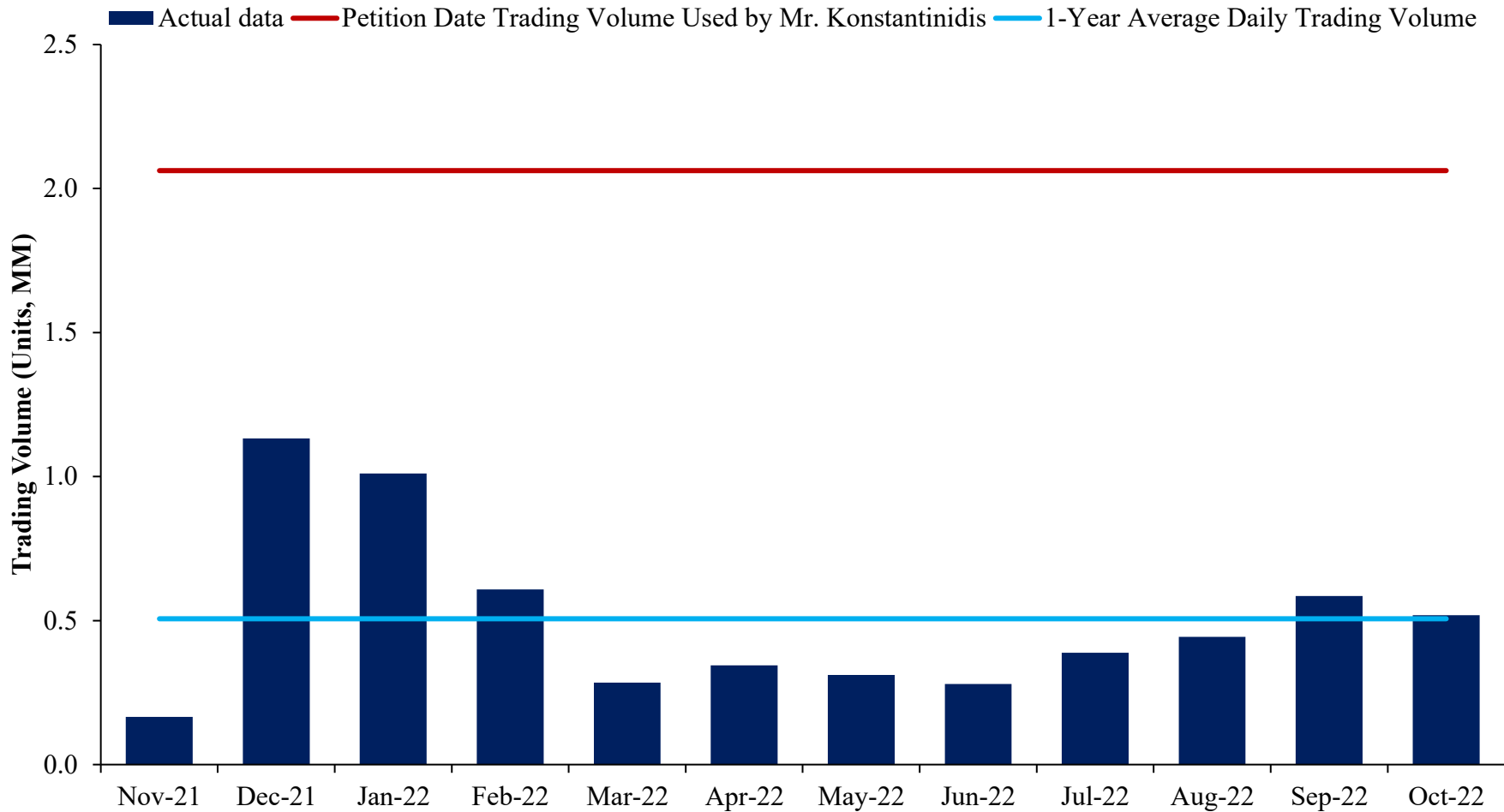
Source: Howell Report.

Exhibit 5C
SRM Daily Trading Volume: Six Months Leading Up to Petition Date
May 11, 2022 - November 11, 2022



Source: Howell Report.

Exhibit 6A
Average Daily Trading Volume of MAPS: 1-Year Prior to CoinDesk Article
November 01, 2021 - October 31, 2022

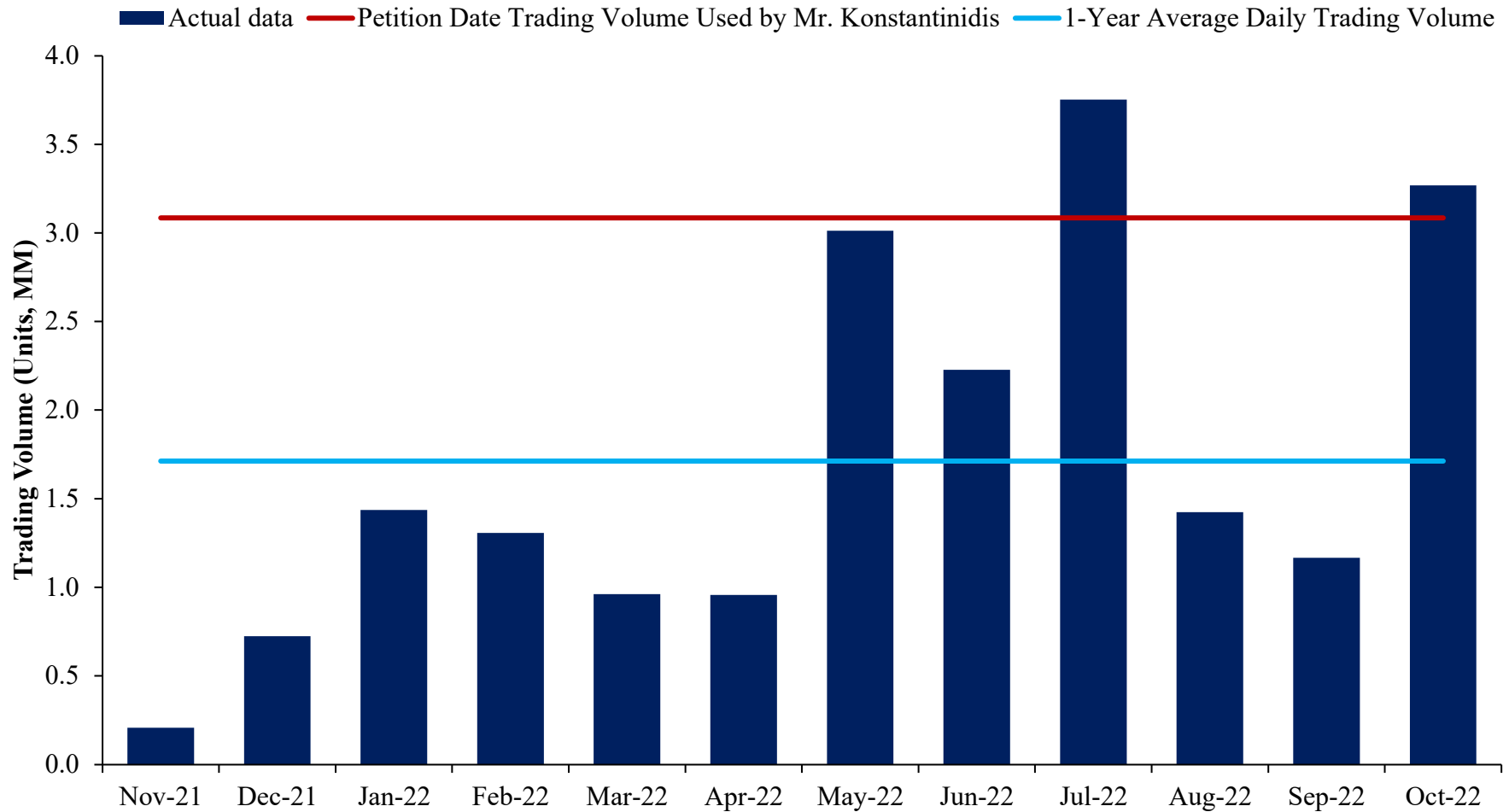


Notes and Sources:

[1] Average trading volume is calculated as the average of daily trading volume in a given month.

[2] Petition Date daily trading volume used by Mr. Konstantinidis for his projection is “the 24-hour averages for the 24 hours prior to the Petition Date and Time” from CoinMarketCap. See MAPS 0000479.XLSX, and Konstantinidis Report, ¶ 45. Actual data is provided by Howell Report.

Exhibit 6B
Average Daily Trading Volume of OXY: 1-Year Prior to CoinDesk Article
November 01, 2021 - October 31, 2022



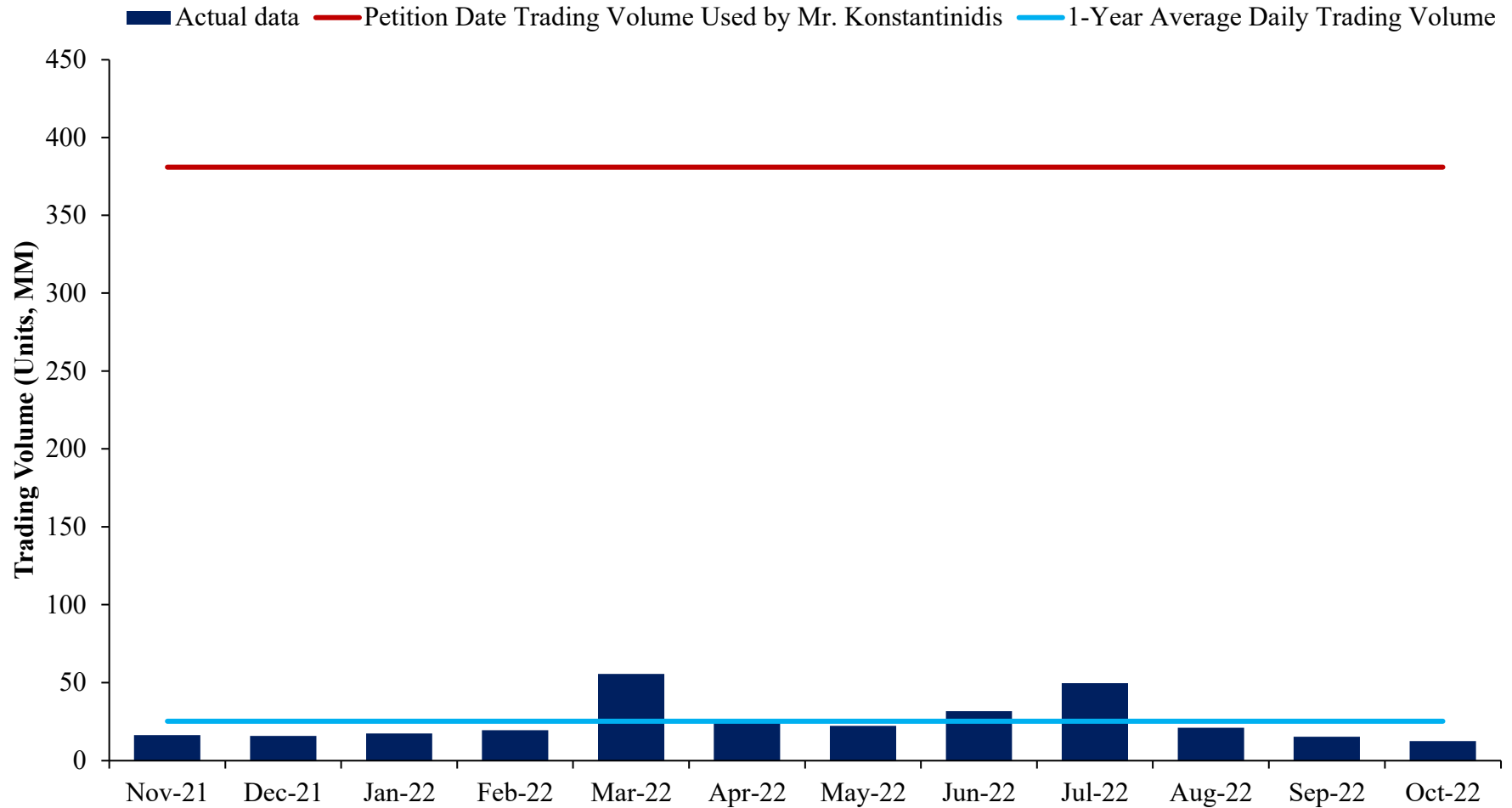
Notes and Sources:

[1] Average trading volume is calculated as the average of daily trading volume in a given month.

[2] Petition Date daily trading volume used by Mr. Konstantinidis for his projection is “the 24-hour averages for the 24 hours prior to the Petition Date and Time” from CoinMarketCap. See MAPS 0000479.XLSX, and Konstantinidis Report, ¶ 45.

Actual data is provided by Howell Report.

Exhibit 6C
Average Daily Trading Volume of SRM: 1-Year Prior to CoinDesk Article
 November 01, 2021 - October 31, 2022



Notes and Sources:

[1] Average trading volume is calculated as the average of daily trading volume in a given month.

[2] Petition Date daily trading volume used by Mr. Konstantinidis for his projection is “the 24-hour averages for the 24 hours prior to the Petition Date and Time” from CoinMarketCap. See MAPS 0000479.XLSX, and Konstantinidis Report, ¶ 45.

Actual data is provided by Howell Report.

Exhibit 7
Year-on-Year Growth in Trading Volumes Assumed by Mr. Konstantinidis

Date	MAPS		OXY		SRM	
	Mean	Median	Mean	Median	Mean	Median
11/11/2023	857.1%	164.5%	857.1%	164.5%	20.9%	11.6%
11/11/2024	20.9%	11.6%	20.9%	11.6%	4.5%	-36.9%
11/11/2025	4.5%	-36.9%	4.5%	-36.9%	7.1%	-26.7%
11/11/2026	7.1%	-26.7%	7.1%	-26.7%	0.0%	-12.8%
11/11/2027	0.0%	-12.8%	0.0%	-12.8%	0.0%	-13.1%
11/11/2028	0.0%	-13.1%	0.0%	-13.1%	0.0%	0.0%
11/11/2029	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
11/11/2030	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Notes and Sources:

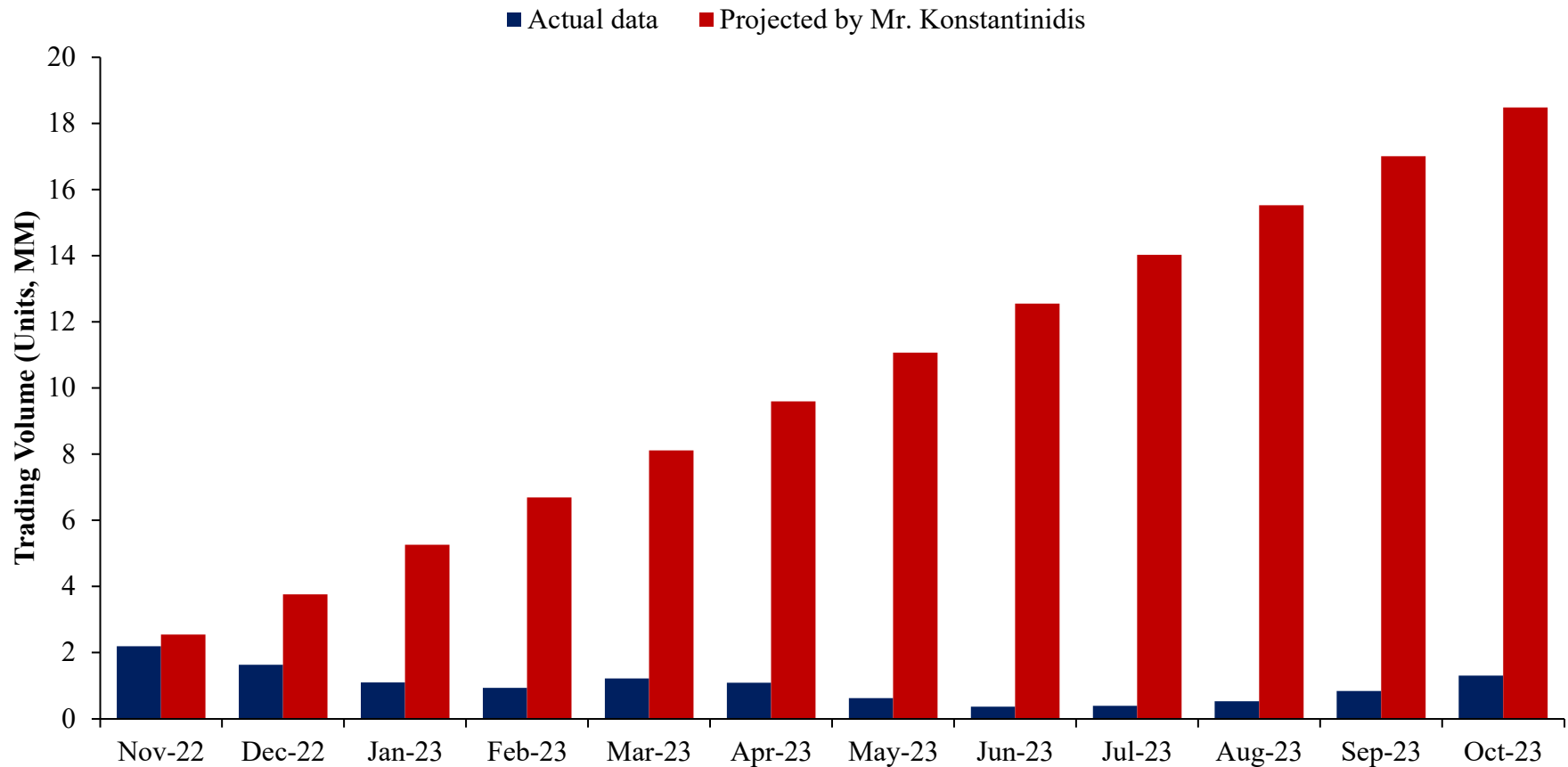
[1] Trading volume data produced by Mr. Konstantinidis. *See* MAPS 0000001.XLSX.

[2] Mr. Konstantinidis calculates year-on-year growth percentages for 20 tokens to forecast trading volumes for MAPS, OXY, and SRM. *See* Konstantinidis Report, ¶ 46.

[3] For the 20 tokens selected, Mr. Konstantinidis calculates average daily trading volume for each calendar year from the date of each token's inception through January 2024. He then uses the average daily trading volume for each calendar year to calculate annual growth rates for each token. He then takes the mean annual growth rate of the 20 tokens based on the number of years since inception (i.e., year-one growth, year-two growth, etc.). He then applies these mean annual growth rates to the Petition Date trading volumes of MAPS, OXY, and SRM, respectively, to forecast their average daily trading volume. *See* MAPS 0000001.XLSX.

[4] Mr. Konstantinidis claims that MAPS and OXY would have 0% volume growth in years 2027-2030, and that SRM would have 0% volume growth in 2026-2030, while the growth of his peer token set suggests negative volume growth over those years. The mean volume growth of Mr. Konstantinidis's peer set suggests volume growth of negative 3.1% and negative 2.4% for MAPS and OXY during 2027 and 2028, and negative 3.1% and negative 2.4% for SRM during 2026 and 2027.

Exhibit 8A
Average Actual and Projected Daily Trading Volume of MAPS
November 12, 2022 - October 31, 2023



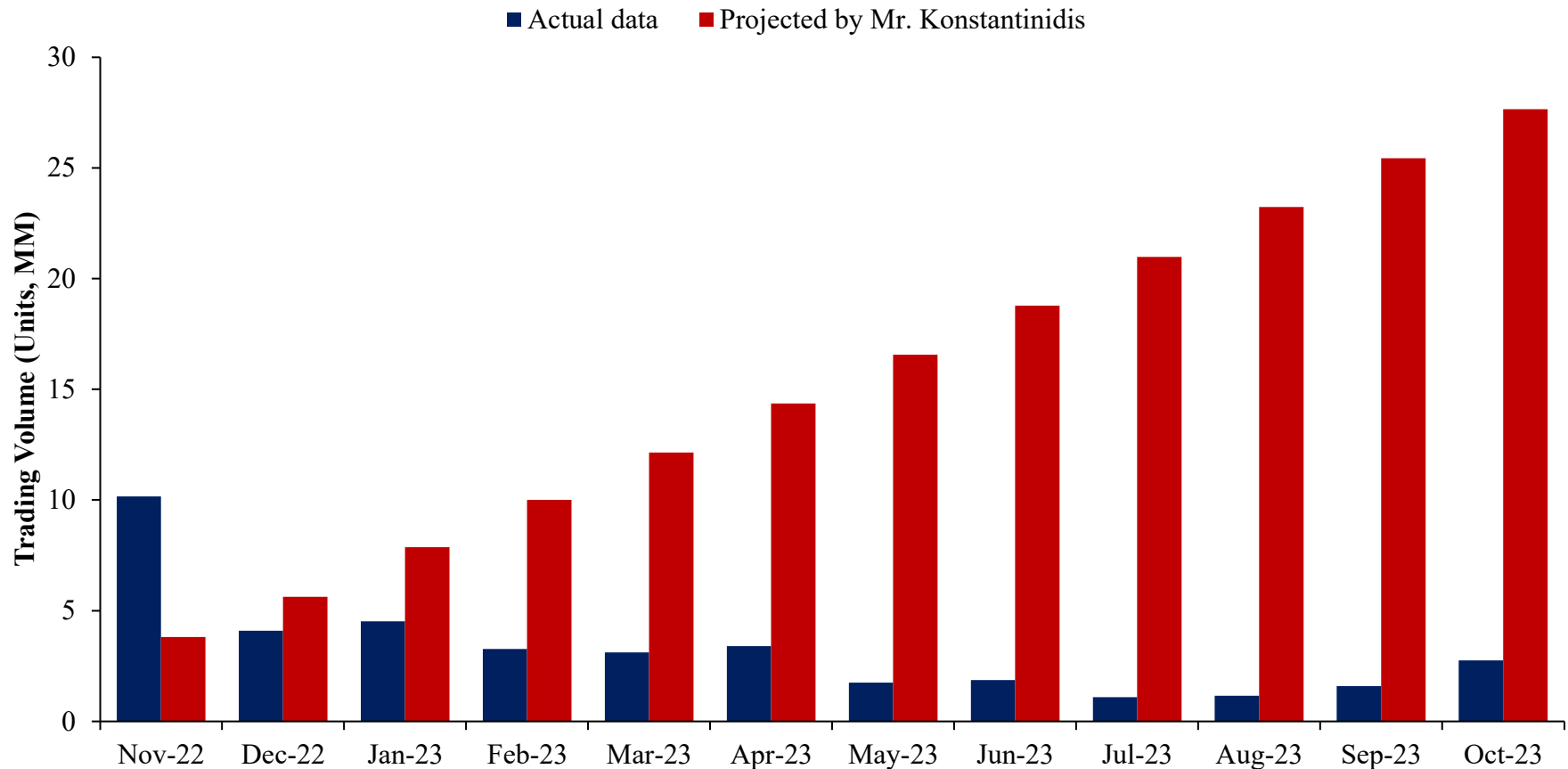
Notes and Sources:

[1] Average trading volume is calculated as the average of daily trading volume in a given month.

[2] As Mr. Konstantinidis' projected volume begins on November 12, 2022, the average daily trading volume for November 2022 is calculated based on the actual and projected data from November 12 to November 30, 2022.

[3] Projected daily trading volume data is provided by Konstantinidis Report. *See* MAPS 0000479.XLSX. Actual data from November 12, 2022 to July 24, 2023 is provided by Howell Report. Actual data from July 25, 2023 to October 31, 2023 is historical trading data from Coin Metrics processed according to the methodology in the Howell Report. *See* CM Historical - OHLCV - Daily - 20231231.txt; Howell Report, Appendix C.

Exhibit 8B
Average Actual and Projected Daily Trading Volume of OXY
November 12, 2022 - October 31, 2023



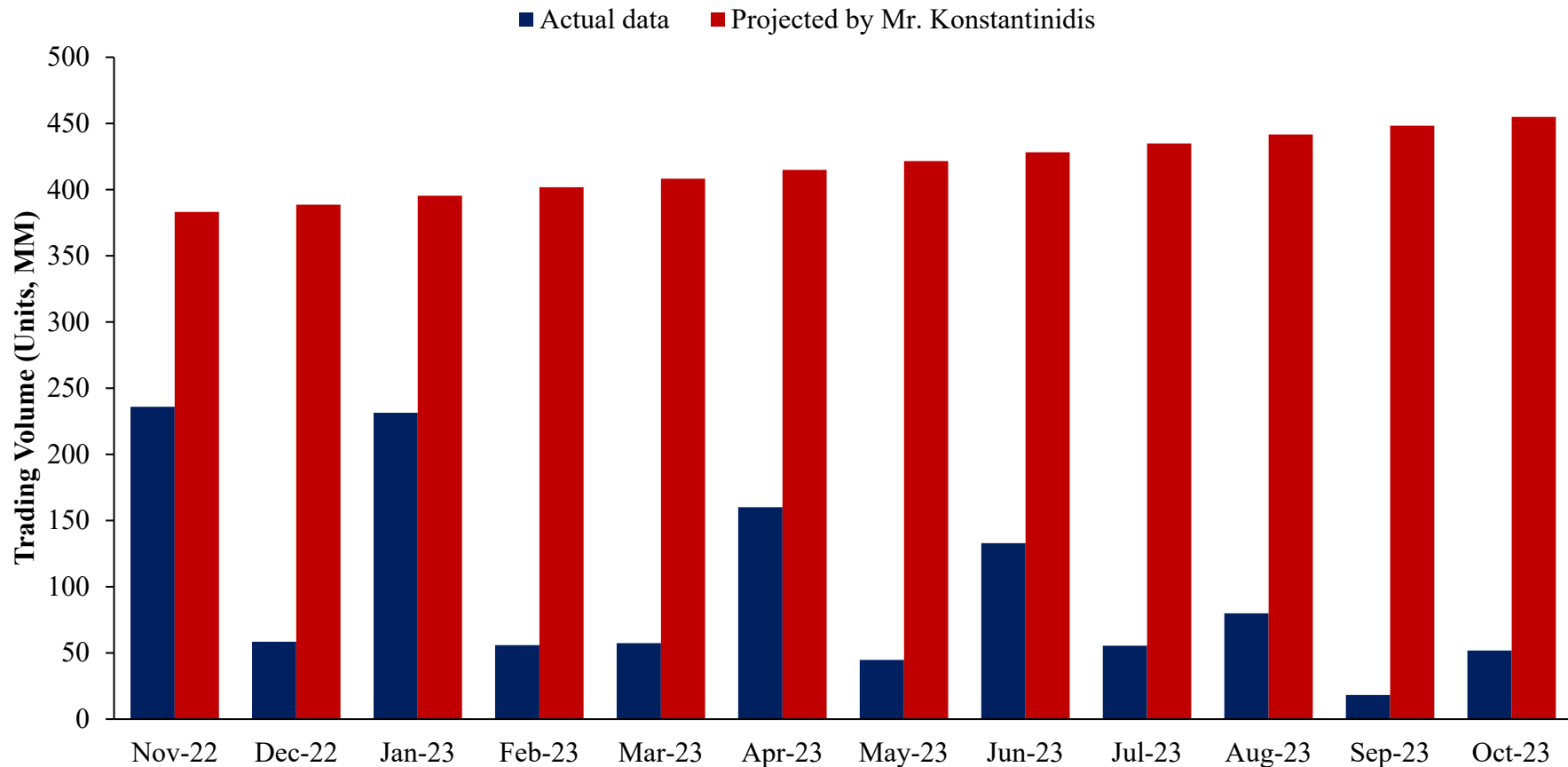
Notes and Sources:

[1] Average trading volume is calculated as the average of daily trading volume in a given month.

[2] As Mr. Konstantinidis' projected volume begins on November 12, 2022, the average daily trading volume for November 2022 is calculated based on the actual and projected data from November 12 to November 30, 2022.

[3] Projected daily trading volume data is provided by Konstantinidis Report. *See* MAPS 0000479.XLSX. Actual data from November 12, 2022 to July 24, 2023 is provided by Howell Report. Actual data from July 25, 2023 to October 31, 2023 is historical trading data from Coin Metrics processed according to the methodology in the Howell Report. *See* CM Historical - OHLCV - Daily - 20231231.txt; Howell Report, Appendix C.

Exhibit 8C
Average Actual and Projected Daily Trading Volume of SRM
November 12, 2022 - October 31, 2023



Notes and Sources:

[1] Average trading volume is calculated as the average of daily trading volume in a given month.

[2] As Mr. Konstantinidis' projected volume begins on November 12, 2022, the average daily trading volume for November 2022 is calculated based on the actual and projected data from November 12 to November 30, 2022.

[3] Projected daily trading volume data is provided by Konstantinidis Report. *See* MAPS 0000479.XLSX. Actual data from November 12, 2022 to July 24, 2023 is provided by Howell Report. Actual data from July 25, 2023 to October 31, 2023 is historical trading data from Coin Metrics processed according to the methodology in the Howell Report. *See* CM Historical - OHLCV - Daily - 20231231.txt; Howell Report, Appendix C.

Exhibit 9A

Sensitivities to Konstantinidis Model - MAPS

Liquidating Entity	Total Liquidated Assets ^[1]	Volume Growth ^[2]	Initial Volume Source ^[3]	Initial Volume (Units) ^[3]	Duration (Years)	Time to Liquidate (Years)	DLOM	
							Konstantinidis Model ^[4]	Ghaidarov Model ^[5]
[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]
Maps Vault Ltd.	3,921,666,631	Yes	Konstantinidis	2,062,501	2.8	5.1	45.4%	51.0%
Maps Vault Ltd.	3,921,666,631	No	Konstantinidis	2,062,501	26.0	52.1	33.2%	99.5%
Maps Vault Ltd.	3,921,666,631	No	Howell	510,221	105.2	210.6	16.9%	100.0%
Fondation Serendipity	2,000,000,000	Yes	Konstantinidis	2,062,501	2.3	5.1	43.2%	45.3%
Fondation Serendipity	2,000,000,000	No	Konstantinidis	2,062,501	13.3	26.6	44.7%	94.1%
Fondation Serendipity	2,000,000,000	No	Howell	510,221	53.7	107.4	21.9%	100.0%
Plaintiffs Combined	5,921,666,631	Yes	Konstantinidis	2,062,501	3.9	7.0	47.9%	60.4%
Plaintiffs Combined	5,921,666,631	No	Konstantinidis	2,062,501	39.3	78.7	26.4%	100.0%
Plaintiffs Combined	5,921,666,631	No	Howell	510,221	158.9	318.0	16.2%	100.0%
Debtor	10,076,921,934	Yes	Konstantinidis	2,062,501	6.0	11.2	49.6%	74.6%
Debtor	10,076,921,934	No	Konstantinidis	2,062,501	66.9	133.9	19.5%	100.0%
Debtor	10,076,921,934	No	Howell	510,221	270.5	541.1	16.1%	100.0%

Notes and Sources:

[1] Total liquidated assets for Plaintiffs is from MAPS 0000479.XLSX. “Plaintiffs Combined” is equal to the sum of total liquidated assets for plaintiffs shown above. Total liquidated assets for debtors is from FTX - Debtors - Coin Report Excel 10.13.23_dist (Clean).xlsx.

[2] Volume growth equal to “Yes” indicates that I scale volume using the rates and methodology applied by Mr. Konstantinidis. *See* Konstantinidis Report, ¶ 46; MAPS 0000479.XLSX. Volume growth equal to “No” indicates that volume remains constant at the initial level.

[3] Mr. Konstantinidis calculates initial volume using the 24-hour average volume as of the Petition Date from CoinMarketCap. Konstantinidis Report, ¶ 45. I calculate the one-year average volume from November 2, 2021 - November 1, 2022 using data from Coin Metrics.

[4] Mr. Konstantinidis calculates discounts implied by the Chaffe Model and the Finnerty Model and computes the average of the two discounts. Konstantinidis Report, ¶ 43. I calculate DLOM using volatility and risk free rates computed by Mr. Konstantinidis.

[5] *See* Ghaidarov, Stillian, “Analysis and Critique of the Average Strike Put Option Marketability Discount Model,” *Working Paper*, 2009, p. 20. I calculate DLOM using volatility and risk free rates computed by Mr. Konstantinidis.

Exhibit 9B
Sensitivities to Konstantinidis Model - OXY

Liquidating Entity	Total Liquidated Assets ^[1]	Volume Growth ^[2]	Initial Volume Source ^[3]	Initial Volume (Units) ^[3]	Duration (Years)	Time to Liquidate (Years)	DLOM	
							Konstantinidis Model ^[4]	Ghaidarov Model ^[5]
							[A]	[B]
Oxygen Vault Ltd.	3,112,825,407	Yes	Konstantinidis	3,085,427	1.9	4.1	36.9%	35.0%
Oxygen Vault Ltd.	3,112,825,407	No	Konstantinidis	3,085,427	13.8	27.6	43.0%	88.9%
Oxygen Vault Ltd.	3,112,825,407	No	Howell	1,731,954	24.6	49.2	33.9%	97.7%
Fondation Serendipity	1,000,000,000	Yes	Konstantinidis	3,085,427	1.8	4.1	35.8%	33.4%
Fondation Serendipity	1,000,000,000	No	Konstantinidis	3,085,427	4.4	8.9	45.1%	55.1%
Fondation Serendipity	1,000,000,000	No	Howell	1,731,954	7.9	15.8	46.7%	73.2%
Fondation Elements	2,000,000,000	Yes	Konstantinidis	3,085,427	1.9	4.1	36.4%	34.3%
Fondation Elements	2,000,000,000	No	Konstantinidis	3,085,427	8.9	17.8	46.5%	76.8%
Fondation Elements	2,000,000,000	No	Howell	1,731,954	15.8	31.6	41.0%	91.7%
Plaintiffs Combined	6,112,825,407	Yes	Konstantinidis	3,085,427	2.9	5.1	41.4%	43.6%
Plaintiffs Combined	6,112,825,407	No	Konstantinidis	3,085,427	27.1	54.3	32.4%	98.4%
Plaintiffs Combined	6,112,825,407	No	Howell	1,731,954	48.3	96.7	23.3%	99.9%
Debtor	9,991,127,106	Yes	Konstantinidis	3,085,427	4.3	7.7	44.8%	53.8%
Debtor	9,991,127,106	No	Konstantinidis	3,085,427	44.3	88.7	24.5%	99.9%
Debtor	9,991,127,106	No	Howell	1,731,954	79.0	158.0	18.2%	100.0%

Notes and Sources:

[1] Total liquidated assets for Plaintiffs is from MAPS 0000479.XLSX. “Plaintiffs Combined” is equal to the sum of total liquidated assets for plaintiffs shown above. Total liquidated assets for debtors is from FTX - Debtors - Coin Report Excel 10.13.23_dist (Clean).xlsx.

[2] Volume growth equal to “Yes” indicates that I scale volume using the rates and methodology applied by Mr. Konstantinidis. *See* Konstantinidis Report, ¶ 46; MAPS 0000479.XLSX. Volume growth equal to “No” indicates that volume remains constant at the initial level.

[3] Mr. Konstantinidis calculates initial volume using the 24-hour average volume as of the Petition Date from CoinMarketCap. Konstantinidis Report, ¶ 45. I calculate the one-year average volume from November 2, 2021 - November 1, 2022 using data from Coin Metrics.

[4] Mr. Konstantinidis calculates discounts implied by the Chaffe Model and the Finnerty Model and computes the average of the two discounts. Konstantinidis Report, ¶ 43. I calculate DLOM using volatility and risk free rates computed by Mr. Konstantinidis.

[5] *See* Ghaidarov, Stillian, “Analysis and Critique of the Average Strike Put Option Marketability Discount Model,” *Working Paper* , 2009, p. 20. I calculate DLOM using volatility and risk free rates computed by Mr. Konstantinidis.

Exhibit 9C

Sensitivities to Konstantinidis Model - SRM

Liquidating Entity	Total Liquidated Assets ^[1]	Volume Growth ^[2]	Initial Volume Source ^[3]	Initial Volume (Units) ^[3]	Duration (Years)	Time to Liquidate (Years)	DLOM	
							Konstantinidis Model ^[4]	Ghaidarov Model ^[5]
[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]
Oxygen Vault Ltd.	7,322,783	Yes	Konstantinidis	380,973,107	2.4	4.8	45.9%	50.7%
Oxygen Vault Ltd.	7,322,783	No	Konstantinidis	380,973,107	2.4	4.8	45.9%	50.7%
Oxygen Vault Ltd.	7,322,783	No	Howell	25,221,283	2.4	4.8	45.9%	50.7%
Maps Vault Ltd.	2,977,644	Yes	Konstantinidis	380,973,107	2.4	4.8	46.0%	50.9%
Maps Vault Ltd.	2,977,644	No	Konstantinidis	380,973,107	2.4	4.8	46.0%	50.9%
Maps Vault Ltd.	2,977,644	No	Howell	25,221,283	2.4	4.8	46.0%	50.9%
Plaintiffs Combined	10,300,427	Yes	Konstantinidis	380,973,107	2.4	4.8	46.0%	50.8%
Plaintiffs Combined	10,300,427	No	Konstantinidis	380,973,107	2.4	4.8	46.0%	50.8%
Plaintiffs Combined	10,300,427	No	Howell	25,221,283	2.4	4.8	46.0%	50.8%
Debtor	9,949,705,778	Yes	Konstantinidis	380,973,107	0.3	0.7	23.0%	18.2%
Debtor	9,949,705,778	No	Konstantinidis	380,973,107	0.4	0.7	23.5%	18.6%
Debtor	9,949,705,778	No	Howell	25,221,283	5.4	10.8	50.9%	76.4%

Notes and Sources:

[1] Total liquidated assets for Plaintiffs is from MAPS 0000479.XLSX. “Plaintiffs Combined” is equal to the sum of total liquidated assets for plaintiffs shown above. Total liquidated assets for debtors is from FTX - Debtors - Coin Report Excel 10.13.23_dist (Clean).xlsx.

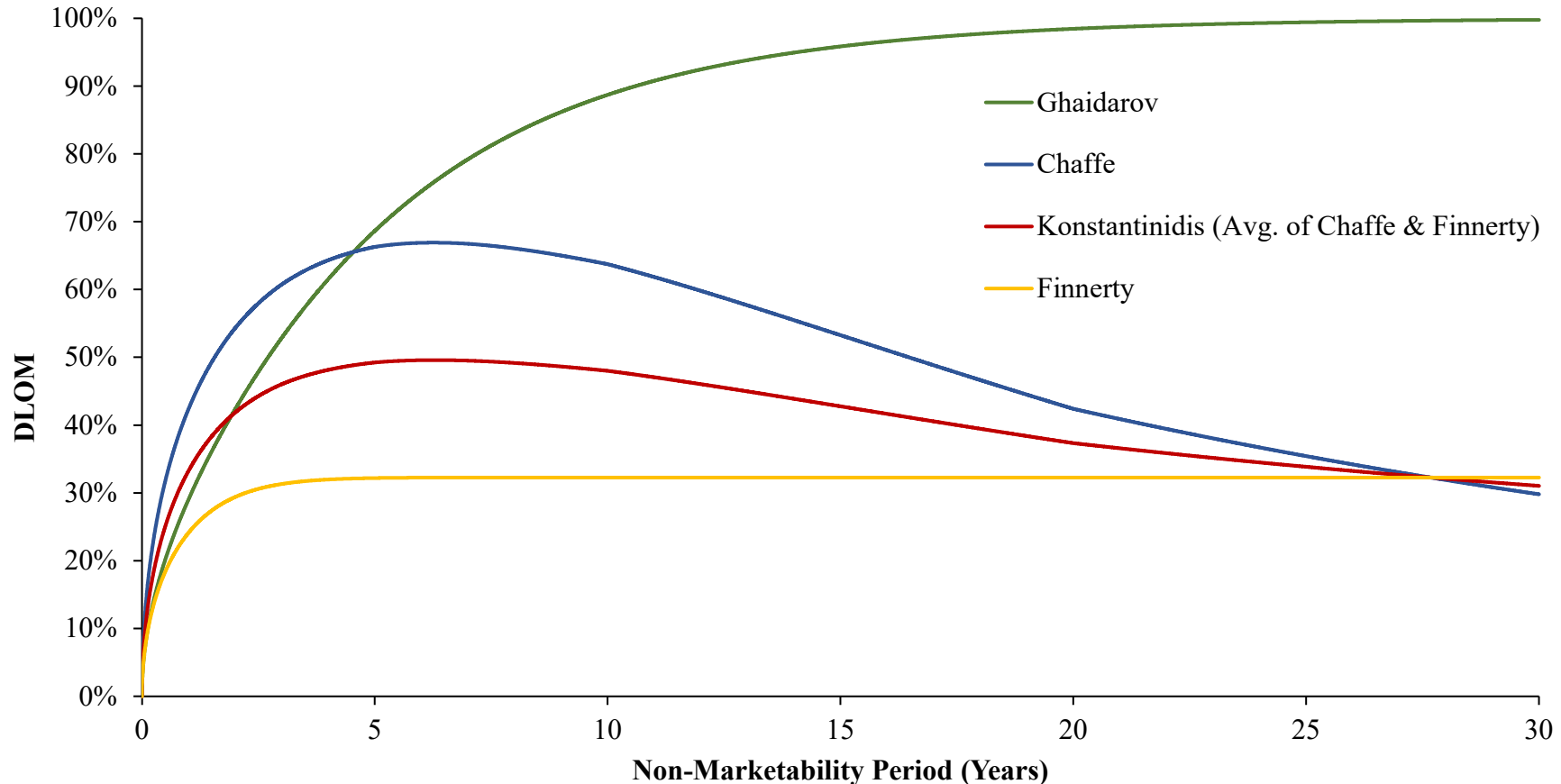
[2] Volume growth equal to “Yes” indicates that I scale volume using the rates and methodology applied by Mr. Konstantinidis. *See* Konstantinidis Report, ¶ 46; MAPS 0000479.XLSX. Volume growth equal to “No” indicates that volume remains constant at the initial level.

[3] Mr. Konstantinidis calculates initial volume using the 24-hour average volume as of the Petition Date from CoinMarketCap. Konstantinidis Report, ¶ 45. I calculate the one-year average volume from November 2, 2021 - November 1, 2022 using data from Coin Metrics.

[4] Mr. Konstantinidis calculates discounts implied by the Chaffe Model and the Finnerty Model and computes the average of the two discounts. Konstantinidis Report, ¶ 43. I calculate DLOM using volatility and risk free rates computed by Mr. Konstantinidis.

[5] *See* Ghaidarov, Stillian, “Analysis and Critique of the Average Strike Put Option Marketability Discount Model,” *Working Paper*, 2009, p. 20. I calculate DLOM using volatility and risk free rates computed by Mr. Konstantinidis.

Exhibit 10A
Comparison of DLOM Models Over 30-Year Time Horizon — MAPS ($\sigma = 121\%$)



Notes and Sources:

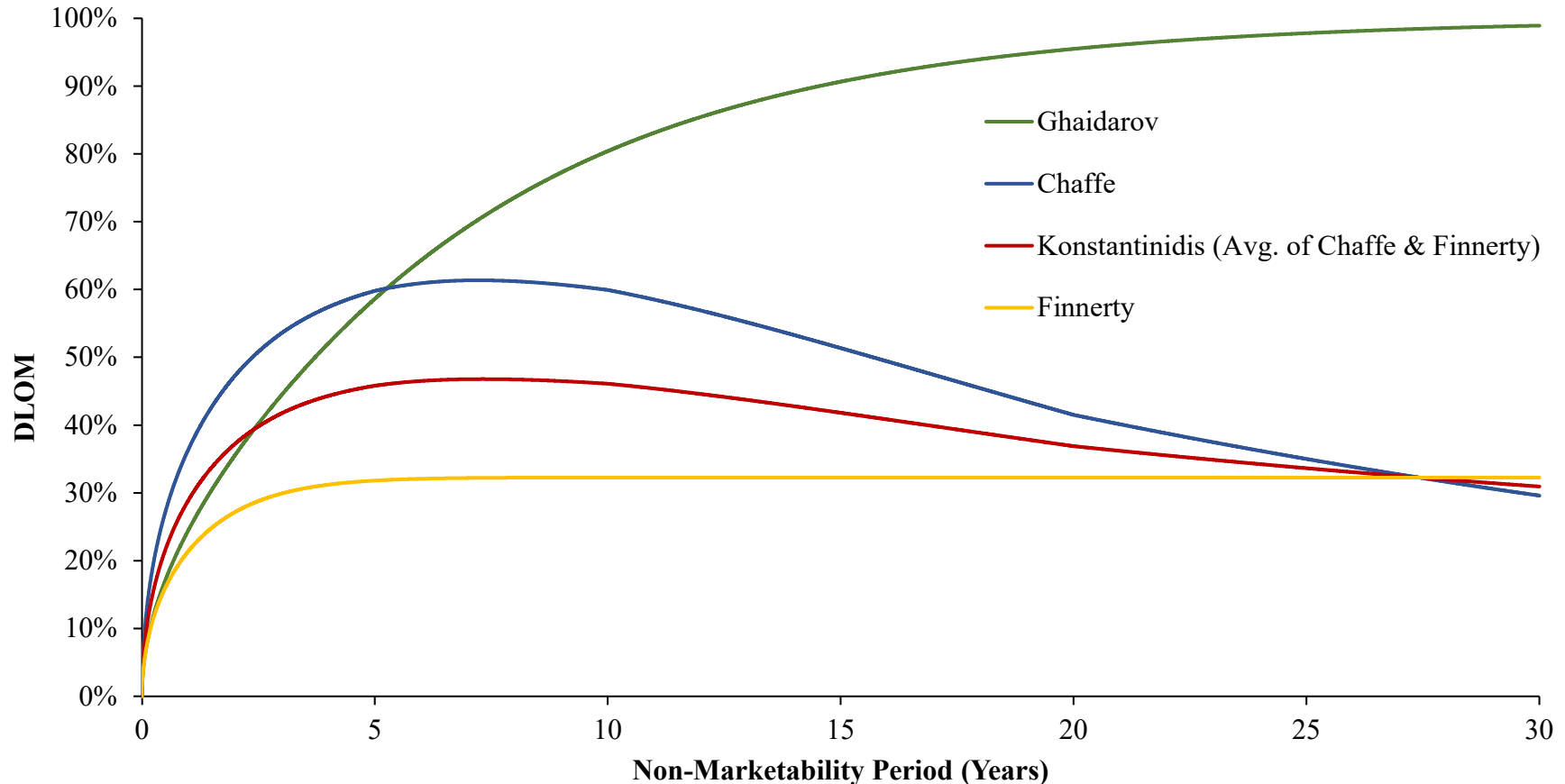
[1] Ghaidarov, Stillian, “Analysis and Critique of the Average Strike Put Option Marketability Discount Model,” *Working Paper*, 2009, pp. 1-15.

[2] Chaffee, David B. H. III, “Option Pricing as a Proxy for Discount for Lack of Marketability in Private Company Valuations,” *Business Valuation Review*, December 1993, pp. 182-188.

[3] Finnerty, John D., “An Average-Strike Put Option Model of the Marketability Discount,” *Journal of Derivatives*, Vol. 19, No. 4, 2012, pp. 53-69. The Finnerty Model asymptotes at 32.3%.

[4] I calculate discount for lack of marketability using volatility and risk free rates computed by Mr. Konstantinidis.

Exhibit 10B
Comparison of DLDM Models Over 30-Year Time Horizon — OXY ($\sigma = 104\%$)



Notes and Sources:

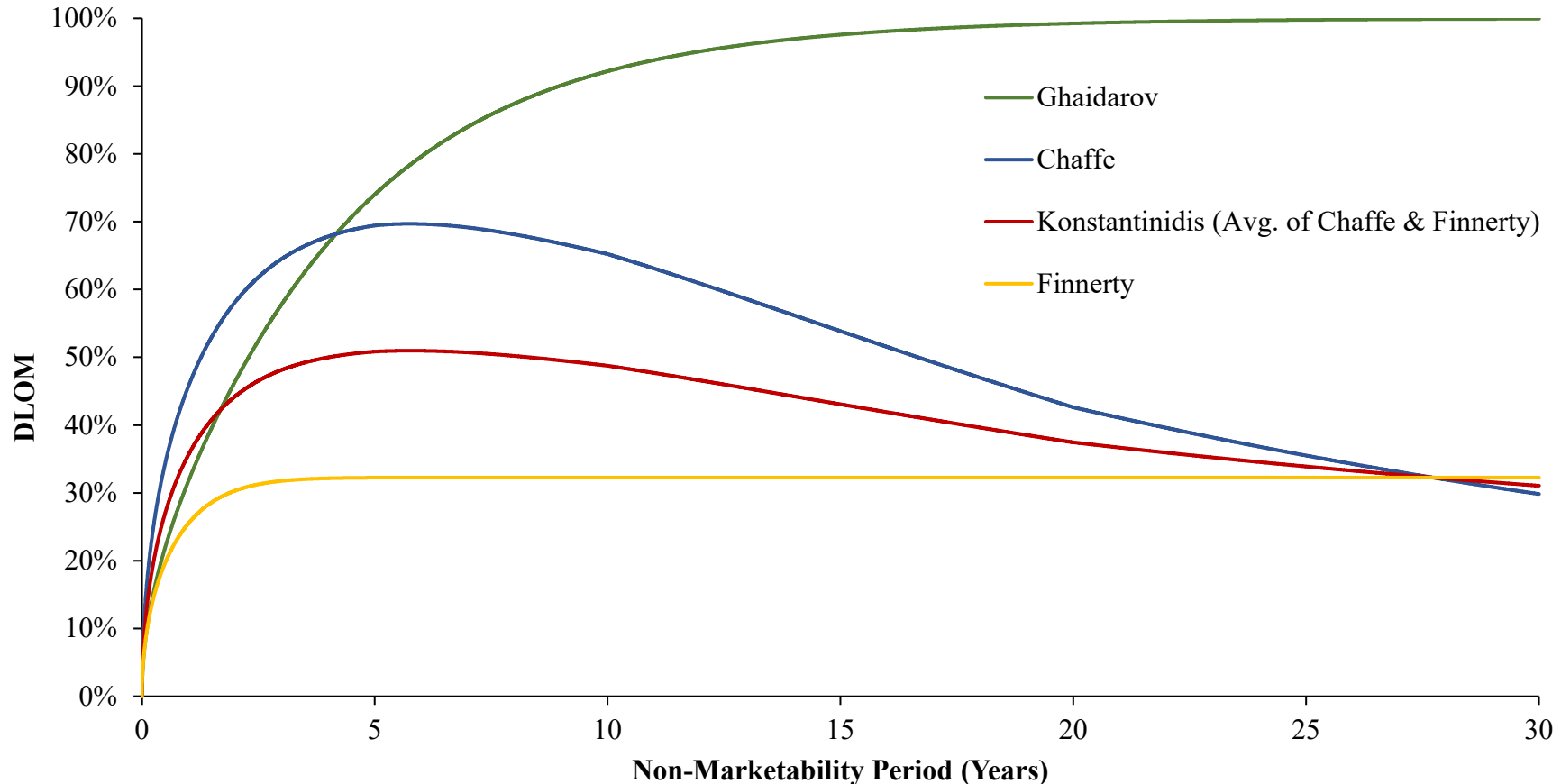
[1] Ghaidarov, Stillian, “Analysis and Critique of the Average Strike Put Option Marketability Discount Model,” *Working Paper*, 2009, pp. 1-15.

[2] Chaffee, David B. H. III, “Option Pricing as a Proxy for Discount for Lack of Marketability in Private Company Valuations,” *Business Valuation Review*, December 1993, pp. 182-188.

[3] Finnerty, John D., “An Average-Strike Put Option Model of the Marketability Discount,” *Journal of Derivatives*, Vol. 19, No. 4, 2012, pp. 53-69. The Finnerty Model asymptotes at 32.3%.

[4] I calculate discount for lack of marketability using volatility and risk free rates computed by Mr. Konstantinidis.

Exhibit 10C
Comparison of DLOM Models Over 30-Year Time Horizon — SRM ($\sigma = 132\%$)



Notes and Sources:

[1] Ghaidarov, Stillian, “Analysis and Critique of the Average Strike Put Option Marketability Discount Model,” *Working Paper*, 2009, pp. 1-15.

[2] Chaffee, David B. H. III, “Option Pricing as a Proxy for Discount for Lack of Marketability in Private Company Valuations,” *Business Valuation Review*, December 1993, pp. 182-188.

[3] Finnerty, John D., “An Average-Strike Put Option Model of the Marketability Discount,” *Journal of Derivatives*, Vol. 19, No. 4, 2012, pp. 53-69. The Finnerty Model asymptotes at 32.3%.

[4] I calculate discount for lack of marketability using volatility and risk free rates computed by Mr. Konstantinidis.